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Thesis
THE FUNCTION OF MEANING IN RETENTION

Submitted by
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First Reader: Dr. Howard L. Kingsley, Professor of Education
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In partial fulfillment of the requirements
for the degree of Doctor of Education

1948

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Words of appreciation of Dr. Howard L. Kingsley are inadequate. His assistance, inspiration and assistance made this study possible.

I am also indebted to Dr. Leslie W. Irwin and Dr. John M. Harmon. The contributions in time and effort by student helpers at Boston University merit my sincere thanks.

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CHAPTER I

INTRODUCTION

I THE IMPORTANCE OF RETENTION

A universal principle of all organic life. The concept of Mnemosyne as the Mother of the Muses indicates the significant role ascribed to this psychological function. Considered in the broadest sense, mneme embraces the concept of all life being conditioned by the past. Stern¹ extends this beyond the individual and makes "racial mneme" synonymous with heredity. Innate functional tendencies² would thus be the result of hereditary factors that are contributed by the parents of the individual at the time of conception. This study is limited to a consideration of the psychological aspect of this subject. It is concerned with the persistence and functional efficacy of tendencies acquired by means of learning. The type of learning investigated is verbal. The tendencies involved are the associative and topical tendencies which make possible the reproduction of learned verbal material after a period of time has followed the

¹William Stern, General Psychology. New York: The MacMillan Company, 1938, page 189.

²Howard L. Kingsley, Nature and Conditions of Learning. New York: Prentice Hall, 1946.

CHAPTER I INTRODUCTION

I THE IMPORTANCE OF RETENTION

A universal principle of all organic life. The concept of memory as the power of the mind indicates the significant role attributed to this psychological function. Considered in the broadest sense, memory embraces the concept of all life being conditioned by the past. Stern¹ extends this beyond the individual and makes "social memory" synonymous with heredity. Innate functional tendencies² would then be the result of heredity factors that are contributed by the parents of the individual at the time of conception. This study is limited to a consideration of the psychological aspect of this subject. It is concerned with the persistence and functional efficacy of tendencies acquired by means of learning. The type of learning investigated is verbal. The tendencies involved are the associative and logical tendencies which make possible the reproduction of learned verbal material after a period of time has followed the

¹William Stern, General Psychology, New York: The Macmillan Company, 1933, page 137.

²Howard I. Kinsley, Nature and Conditions of Learning, New York: Prentice Hall, 1933.

learning. It is a study in associative memory.

II NATURE OF RETENTION

Receptacle. One of the earliest viewpoints was that this "faculty" existed in a fixed amount. Facts, ideas and skills could be poured into this "zone" and retained. David Kay¹ aptly illustrated this approach with a quotation from Locke:

"memory is as it were the storehouse of our ideas:...In some persons the mind retains the characters drawn upon it like marble, in others like freestone, and in others little better than sand."

The retentive quality of the nervous system as the basis of individual differences in retentive capacity is still considered sound, altho the "receptacle" concept of memory is no longer tenable.

Unconscious complexes of ideas.² The psycho-analytical theory, which postulates "unconscious ideas" violently opposing any attempt to be brought into consciousness, assumes that content as ideas exists during the latent period in the unconscious. While modern psychologists recognize the unconscious nature of dis-

¹David Kay, Memory. New York: D. Appelton and Company, 1888, page xxiv.

²William Stern, General Psychology. New York: The MacMillan Company, 1938, pages 211-213.

learning. It is a study in associative memory.

II. NATURE OF RETENTION

Postscript. One of the earliest observations was that this "faculty" existed in a fixed amount. Ideas and skills could be poured into this "store" and retained. David Kay¹ again illustrated this approach with a quotation from Locke:

"Memory is as it were the storehouse of our ideas:... In some persons the store is small, the capacity narrow, and in others it is large, and in others it is better than in others."

The relative quality of the nervous system at the basis of individual differences in retention capacity is still considered sound, although the "psychic" capacity of memory is no longer tenable.

Unconscious components of ideas.² The psycho-analytic

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¹David Kay, Memory, New York: C. Appleton and Company, 1902, page xiv.

²William Stern, General Psychology, New York: The Macmillan Company, 1905, pages 211-212.

positions, states of readiness and attitudes which persist during the interval between learning and recall, they do not regard these as mental entities.

Physiological. The most generally accepted assumption, at present, is that a learning activity leaves a more or less permanent structural change in the organism which is commonly referred to as a "trace". This modification is, of course, not directly observable but is inferred from the modified activity of the learner. Lashley¹ after extensive experimentation with normal rats, as well as those which had undergone various degrees of decortization reports: "We seem forced to conclude that the entry into a cul-de-sac leaves traces in the normal rat which for a time inhibit re-entry." This point of view is also shared by Rautt,² who believes that,..."all memories are contained in each of the nerve fibers in the association systems." This neurological theory of retention is supported by the fact that brain injuries and diseases of the brain are associated with abnormal losses

¹K. S. Lashley, "Nervous Mechanisms in Learning" in C. Murchison, ed., Foundations of Experimental Psychology. Worcester, Massachusetts: Clark University Press, 1929, pages 535-536.

²Joshua Rautt, The Mechanism of Thought, Imagery and Hallucination. New York: Columbia University Press, 1939, page 112.

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¹ J. S. Lashley, "Hippocampal Lesions in Learning," in C. H. Warriss, ed., Foundations of Experimental Psychology, Worcester, Massachusetts: Clark University Press, 1937, pages 225-235.

² Joshua Hunt, The Mechanism of the Mind, Lashley and Hollnagel, New York: Columbia University Press, 1939, page 112.

of memory. Further support of this view is found in the fact that psychological functions are dependent on brain functions.

III CONDITIONS OF FORGETTING

Disuse. Many writers have attempted to explain the almost universal phenomenon of forgetting by postulating a "law of disuse" according to which disuse produces forgetting or a decrease in retention occurs during a period of no exercise. This is the explanation of forgetting presented by Thorndike in his "Law of Exercise". In terms of his connectionistic theory of learning Thorndike¹ writes: "To a situation, 'a modifiable connection not being made by him between a situation S and a response R, during a length of time T', a man responds originally, other things being equal by a decrease in the strength of that connection." This is to say that one forgets if he does not exercise the associative tendency by way of review, recital or some other form of use. This explanation is not satisfactory in the light of discoveries made by recent research. Sometimes there is an increase in measured retention during an interval of no

¹E. R. Thorndike, "Educational Psychology, Briefer Course," New York: Teachers College, Columbia University, 1916, page 70.

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¹E. H. Thorndike, "Educational Psychology", Brief Course, New York: Teachers College, Columbia University, 1918, page 70.

practice and sometimes, as in cases of negative adaptation, experimental extinction and in trial-and-error learning, a response grows weaker and disappears under repetition. Moreover, a number of studies on forgetting during periods of sleep have indicated very little loss of retention during such periods.^{1,2,3} This has given rise to the modern belief that forgetting is an active process in which the memory traces are impaired or obliterated by activity of the brain following learning and that it is not simply due to disuse of the "connections" acquired during learning. Time is required for both learning and forgetting but neither can be explained in terms of it.

Retroactive inhibition. There is an impressive amount of experimental evidence which indicates that the activities occurring during the interval between learning and recall affect the degree of forgetting.⁴ Experiments

¹John G. Jenkins, and Karl M. Dallenback, "Obliviscence During Sleep and Waking," American Journal of Psychology, 1924, 35, 605-612.

²Edwin B. Newman, "Forgetting of Meaningful Material During Sleep and Waking," American Journal of Psychology, 1939, 52, 65-71.

³Edward B. Van Ormer, "Retention After Intervals of Sleep and of Waking," Archives of Psychology, 1932, 21, No. 137.

⁴Steuart H. Britt, "Retroactive Inhibition: A Review of the Literature," Psychological Bulletin, 1935, 32, 381-440.

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³Edward S. Van Cester, "Retention After Intervals of Sleep and of Waking," Archives of Psychology, 1932, 21, No. 137.

⁴Stewart H. Burt, "Retrospective Inhibition: A Review of the Literature," Psychological Bulletin, 1932, 32, 381-440.

on animals, children and adults with an extensive range of materials have demonstrated for all measures of retention that the forgetting curve reflects the influence of events which occupy the retention interval.

IV THE MATERIAL LEARNED AS A FACTOR IN RETENTION

Nonsense syllables. Beginning with the pioneer work of Ebbinghaus¹ (1885) a large number of investigators have found under a wide variety of experimental conditions that the characteristic retention curve for nonsense syllables is a decelerated one with a rapid initial drop followed by a much slower rate of forgetting as the interval is increased.

Meaningful verbal materials. Curves of retention, plotted for meaningful material have been found to run at a higher level than those for nonsense material, but in these curves the same sharp initial drop followed by a negatively accelerated rate of decline has been found. The fact that meaningful material is learned much more rapidly than the nonsense syllables and shows a higher retention level has led most writers to assume that meaningful material is retained better than nonsense

¹Hermann Ebbinghaus, Memory, (trans. by H. A. Ruger and Clara E. Busenius). New York: Teachers College, Columbia University, 1913.

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¹ Hermann Ebbinghaus, *Memory*, (trans. by W. D. Dyer and Clara E. Bessinger), New York: Teachers College, Columbia University, 1913.

material. This has not been adequately established by approved experimental procedures. The studies of retention for meaningful and non-meaningful material have been made under different learning and testing conditions.

McGeoch¹ states, "The literature abounds in reports of the retention values of various materials, but not in systematic comparisons", and "...unfortunately the data do not permit quantitative comparisons between materials."² Hunter,³ also, suggests the need for further investigation in this area, and states: "There is a dearth of carefully controlled experimental data bearing upon the problem."

It has been established by experimental studies that the degree of retention is not only a function of the material but also of the methods and conditions of measurement. It may be that if different materials are learned to the same criterion, the retention may be more nearly equivalent under some measurements of retention than

¹John A. McGeoch and A. W. Melton, "The Comparative Retention Values of Maze Habits and Nonsense Syllables", Journal Experimental Psychology, 1929, 12, 392-414.

²John A. McGeoch, The Psychology of Human Learning, New York: Longman's, Green and Company, 1942, page 366.

³Walter S. Hunter, Foundations of Experimental Psychology, Carl Murchison, Ed., Worcester, Massachusetts: Clark University Press, 1929, page 367.

material. This has not been adequately established by approved experimental procedures. The studies of retention for meaningful and non-meaningful material have been made under different learning and testing conditions. McGeech¹ states, "The literature abounds in reports of the retention values of various materials, but not in systematic comparisons", and "...consequently the data do not permit quantitative comparisons between materials."² Hunter,³ also, suggests the need for further investigation in this area, and states: "There is a dearth of carefully controlled experimental data bearing upon the problem."

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¹John A. McGeech and A. W. Wilson, "The Comparative Retention Values of Nonsense Syllables and Nonsense Sentences," Journal Experimental Psychology, 1929, 12, 338-345.

²John A. McGeech, "The Psychology of Human Learning," New York: Longman's, Green and Company, 1933, page 252.

³Walter D. Hunter, Foundations of Experimental Psychology, Carl H. Kucharski, Ed., Worcester, Massachusetts: Clark University Press, 1932, page 327.

under others. Guilford¹ assumes that the "...strength of the impression in the nervous system" is a function of the degree of learning and not the kind of material.

The problem. The purpose of the present investigation is to discover the influence of degree of meaning of the learning material upon retention. To secure different degrees of meaning lists of the following types of material were prepared: (1) nonsense syllables, (2) meaningful, unrelated words, and (3) topically related words. The logically related list was used in an attempt to explore the factor of intra-list organization such as is found in topical or substance learning and still to maintain units which make possible quantitative measurement and comparison. This apparently has not been done in previous studies on this problem in which prose and poetry have been used. In order to make possible a direct quantitative comparison of the data on retention these three types of material were learned under similar conditions, and the retention of each was measured after intervals of the same length and by the same methods. A preliminary experiment was conducted to derive learning tasks of approximately equal difficulty. A new type of

¹J. P. Guilford, Laboratory Studies in Psychology, New York: Henry Holt and Company, 1934, page 121.

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tasks of approximately equal difficulty. A new type of

learning procedure was devised by which it was possible to determine how much of each kind of material could be mastered in a fixed period of time. This method was a modification of the method of complete mastery. It is called the "progressive mastery method". A constant learning period of five minutes was used for the three kinds of learning material. The average number of items learned by this method in the five-minute period by thirty subjects in the preliminary study was approximately nine nonsense syllables, thirteen unrelated words, and sixteen related words. In the experiments that followed the subjects were presented individually, lists of nine nonsense syllables, thirteen unrelated words, and sixteen topically related words. In this way an attempt was made to make the learning tasks approximately equal in difficulty for the three kinds of material, a control not undertaken in previous studies. Each of the three lists was learned by each subject to the point of complete mastery as determined by one perfect recital. Retention was tested by relearning and by written recall after intervals of thirty minutes or of one week. The study was extended by means of group experiments in which the same lists were used but a different procedure was followed. Here the lists were presented to and studied by the subjects for a period of two minutes

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and retention was measured by the method of retained members after periods of thirty minutes, forty-eight hours or one week.

By these procedures, which are described more fully in Chapter III, the learning tasks for the three types of material were closely equated for difficulty in the individual experiments, and completely equated for time in the group experiments. Since each subject learned all three types of material the equating of the learners for the different materials was fully achieved. The testing procedures and retention intervals were the same for the different materials. By these experimental controls this study has sought to make valid quantitative comparisons between the retention of learning materials having varying degrees of meaning.

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CHAPTER II

HISTORICAL BACKGROUND

I THE CURVE OF RETENTION

The Ebbinghaus curve. A great deal of evidence has been accumulated by experimental psychologists in their attempts to investigate retention. The pioneer in the experimental study of associative memory was Hermann Ebbinghaus. In his monumental work he not only invented the nonsense syllable as a more exact quantitative unit but also devised the relearning or saving method of measuring retention. The nonsense syllable as used by Ebbinghaus consisted of two consonants with a vowel between them. This enabled him to learn several hundred lists of varying lengths which consisted of comparable quantitative units. These items were relatively free from associations due to previous learning. He thus avoided uncontrolled variables of prior learning and secured uniform quantitative units. The retention of these lists was measured at various intervals by comparing the time required to relearn the lists to the same criterion achieved in the original learning with the original learning time. Figure 1 indicates the per cent retained after various intervals when the syllables were learned to the criterion of two successive correct re-

CHAPTER II HISTORICAL BACKGROUND

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citals and when retention was measured by the time saved in relearning. This curve is often referred to as "the" curve of retention. While his study has been a model for scores of subsequent investigators and his findings have been corroborated repeatedly, there is no one curve which may be called "the" curve of retention except for specific materials, conditions and measures of retention.

Meaningful materials. Many of the studies on retention following Ebbinghaus have dealt with meaningful materials. There has been a great deal of exploration with poetry¹ and prose,^{2,3} as well as, nonsense syllables in which both children and adults have served as subjects. In general the evidence obtained on a large number of subjects has coincided with Ebbinghaus' data which were based on his own performance. Although the method of measurement⁴

¹Paul L. Whitely and John A. McGeoch, "The Curve of Retention for Poetry" Journal of Educational Psychology, 1928, 19, 471-479.

²Alfred G. Dietze and George Ellis Jones, "Factual Memory of Secondary School Pupils for a Short Article Which They Read a Single Time", Journal of Educational Psychology, 1931, 22, 586-598:667-676.

³Lester J. Briggs and Homer B. Reed, "The Curve of Retention for Substance Material", Journal of Experimental Psychology, 1943, 32, 513-571.

⁴C. W. Luh, "The Conditions of Retention", Psychological Monographs, 1922, Vol. 31, 3.

obtains and when reproduction was measured by the time saved in relearning. This curve is often referred to as "the" curve of retention. While this study has been a model for scores of subsequent investigations and his findings have been corroborated repeatedly, it is in no sense unique. It may be called "the" curve of retention except for specific materials, conditions and methods of retention.

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¹Paul I. White and John A. McKeon, "The Curve of Retention for Poetry," Journal of Educational Psychology, 1928, 19, 471-472.

²Alfred C. Diefen and George E. Latta, "Retention Memory of Secondary School Pupils for a Short Article Which They Read a Single Time," Journal of Educational Psychology, 1921, 12, 555-562; 557-558.

³Lawrence A. Jervis and Henry E. Wood, "The Curve of Retention for Nonsense Material," Journal of Experimental Psychology, 1925, 10, 513-521.

⁴O. W. Loh, "The Conditions of Retention," Psychological Monographs, 1922, Vol. 31, 2.

is a factor influencing the amount of retention indicated by the scores, retention curves derived from different methods of measurement usually show approximately the same form indicating a sharp initial drop followed by a gradual decline. However, the curves showing the retention of meaningful materials have usually run at a higher level than those for nonsense syllables. Williams,¹ findings are based on the records of adults who learned fifty monosyllabic words for five minutes, then recalled them immediately and after an interval. The immediate recall was considered 100 per cent and the delayed recalls were expressed as per cents of the immediate recall. Inspection of the graphs in Figures 1 and 2 clearly reveals resemblance of the general form of the two curves, as well as, the fact that the meaningful material is retained better throughout the intervals tested. Boreas² found in a study based on the performance of twenty students that poetry was relearned after twenty-four hours with a saving of 75 per cent while for nonsense material there was a saving

¹O. Williams, "A Study of the Phenomona of Reminiscence", Journal Experimental Psychology, 1926, 9, 368-387.

²Th. Boreas, Experimental Studies on Memory. II The Rate of Forgetting, *Proktika de l' Academic d' Athenes*, 1930, 5, 382 ff.- (In Greek with an English Summary), Psychological Abstracts, Vol. VII, 1938.

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¹ O. Williams, "A Study of the Phenomenon of Retention," Journal Experimental Psychology, 1924, 9, 265-287.
² B. Borras, "Experimental Studies on Memory. II The Retention of Poetry," Psychologia de I. Academie B. Romania, 1930, 3, 121-122. (In Greek with an English Summary), Psychological Abstracts, Vol. VII, 1936.

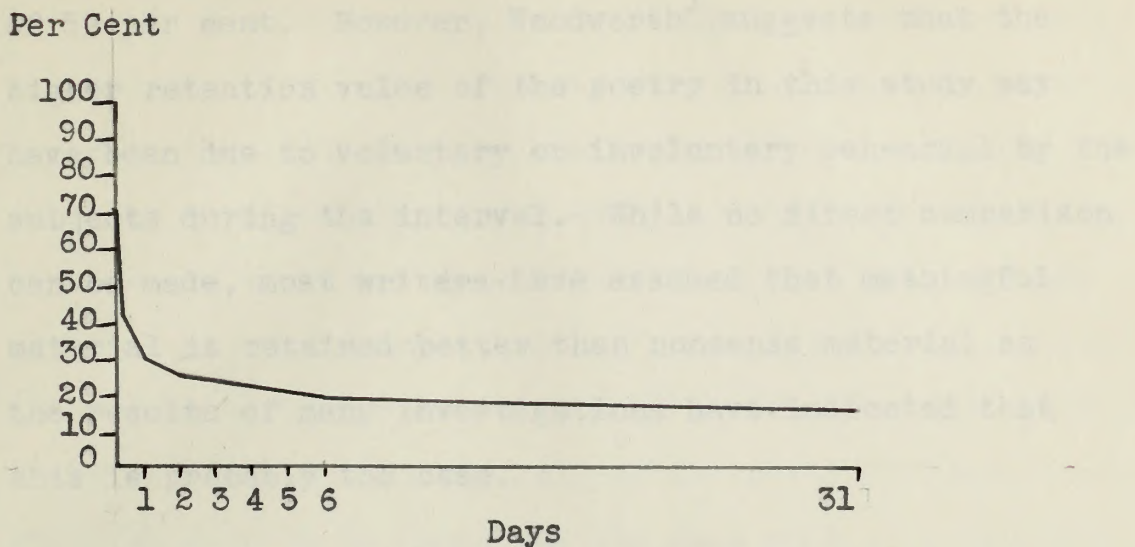


Fig. 1. Curve of Retention (Ebbinghaus)
for Nonsense Syllables as Measured by Relearning

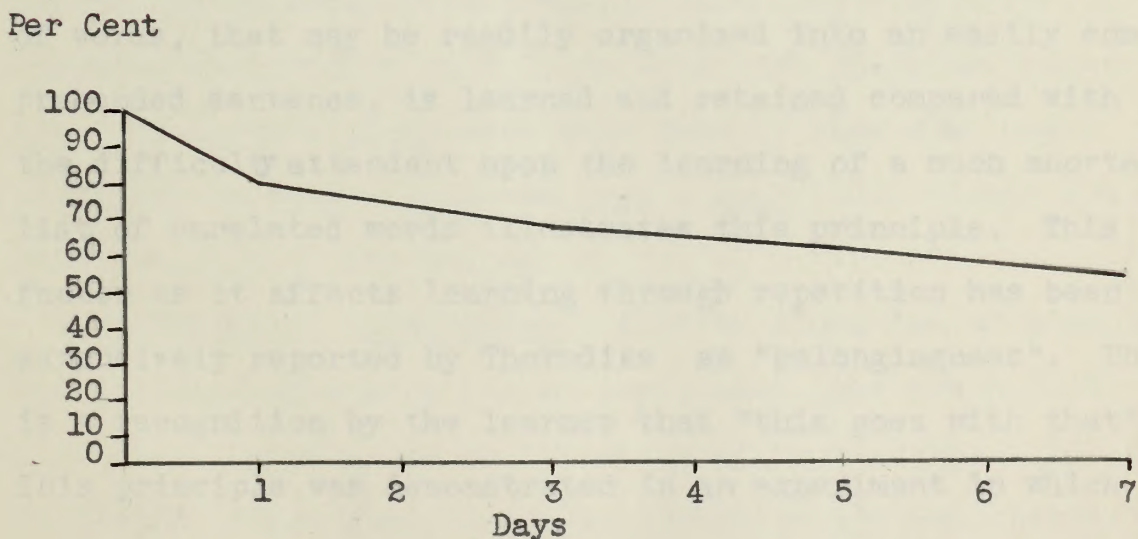


Fig. 2. A Retention Curve for 50 Monosyllabic
Words as Measured by Recall
(Williams, Journal of Experimental Psychology,
1926, 9, 373.)

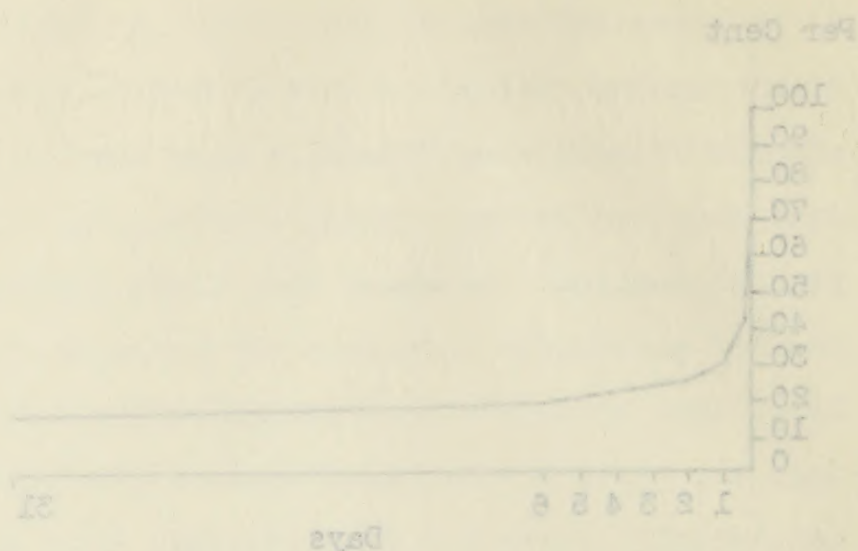


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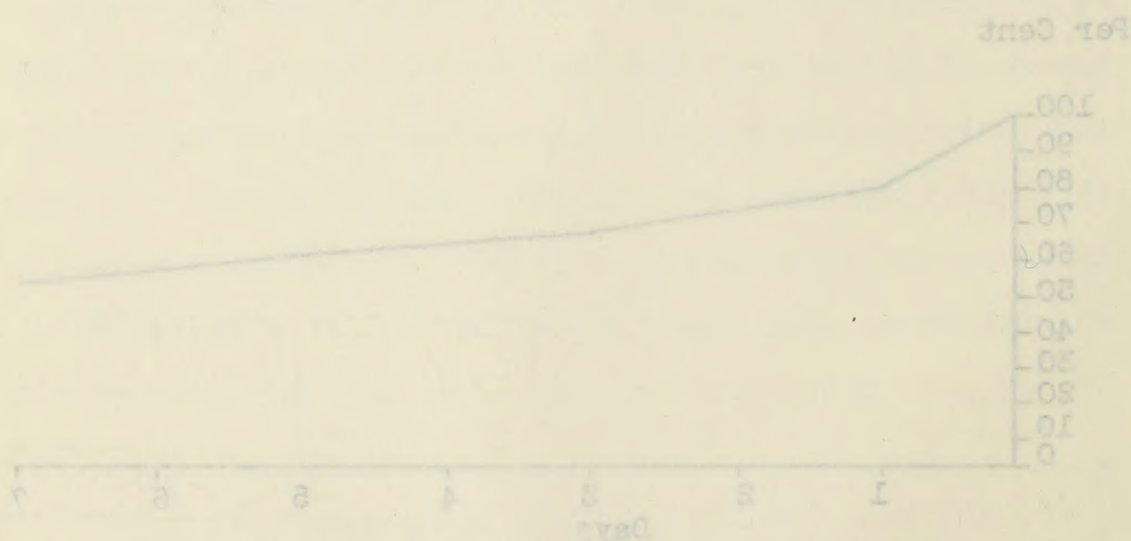


Fig. 2. A Retention Curve for 50 Monosyllabic
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(Williams, Journal of Experimental Psychology,
1922, 9, 273.)

of 59 per cent. However, Woodworth¹ suggests that the higher retention value of the poetry in this study may have been due to voluntary or involuntary rehearsal by the subjects during the interval. While no direct comparison can be made, most writers have assumed that meaningful material is retained better than nonsense material as the results of many investigations have indicated that this is probably the case.

II ORGANIZATION OF THE LEARNING MATERIAL

Belongingness. The results are even more convincing that organized meaningful material has superior retention value. The facility with which a comparatively long list of words, that may be readily organized into an easily comprehended sentence, is learned and retained compared with the difficulty attendant upon the learning of a much shorter list of unrelated words illustrates this principle. This factor as it affects learning through repetition has been extensively reported by Thorndike as "belongingness". This is a recognition by the learner that "this goes with that". This principle was demonstrated in an experiment in which

¹Robert S. Woodworth, Experimental Psychology, New York: Henry Holt and Company, 1938, page 55.

²E. L. Thorndike, Human Learning, New York: Appleton Century Company, 1931, pages 20-23.

of 80 per cent. However, Goodworth suggests that the higher retention value of the poetry in this study may have been due to voluntary or involuntary rehearsal by the subjects during the interval. While no direct measurement can be made, most writers have assumed that meaningful material is retained better than nonsense material as the results of many investigations have indicated that this is probably the case.

II ORGANIZATION OF THE LEARNING MATERIAL

Rehearsal. The results are even more revealing that organized meaningful material has superior retention value. The facility with which a conceptually long list of words, that may be readily organized into an easily comprehended sentence, is learned and retained compared with the difficulty attendant upon the learning of a much shorter list of unrelated words illustrates this principle. This factor as it affects learning through repetition has been extensively reported by Thorndike as "behaviorism". This is a recognition by the learner that "this goes with that". This principle was demonstrated in an experiment in which

¹Robert A. Goodworth, Experimental Psychology, New York: Henry Holt and Company, 1928, page 82.

²E. L. Thorndike, Human Learning, New York: Appleton Century Company, 1931, pages 52-53.

two hundred students were read twenty-four unrelated sentences six times. The students were then asked to name the word that followed various words in the sentences. The per cent recalled when there was the element of belonging between the words was much higher than when this element was absent. For example, almost none of the subjects were able to name the correct word when it was the first word of a new sentence but nearly half of the responses were correct when the word to be named was the last word of a person's name following the first name. This great difference Thorndike attributed to the degree of belonging existing between the pairs of words. This same phenomenon is frequently observed in paired-associate learning. For example, the subject will learn such word pairs as bow - arrow or horse - wagon much more readily than such combinations as book - land and snow - soap. The former are familiar, i.e., they belong.

Intraserial integration. Another dimension of meaning was explored by Sisson¹ in an experiment in which he had lists made up of nonsense syllables of high associative value and others composed of syllables of low associative

¹E. Donald Sisson, "Retroactive Inhibition: The Influence of Degree of Associative Value of Original and Interpolated lists", Journal of Experimental Psychology, 1938, 22, 573-580.

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Intersensory Association. Another dimension of meaning
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¹E. Sisson, "Retrospective Association: The Influence
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 Lists", Journal of Experimental Psychology, 1933, 17, 273-
 280.

value. The associative value indicates the ease with which the learner finds meaning in a syllable through association of some sort. It was found that there was less retroactive inhibition when the original list and the interpolated list differed in associative value. The organization of each list into a separate pattern aided retention as it decreased the interference caused by learning another list. Based on his findings Sisson formulated the following hypothesis: "Where two activities are mutually isolated in the total organization of behavior, by whatever means this isolation can be achieved, retroaction will be reduced to a minimum." This view suggests that retention is affected by the relations between materials learned at different times and that a high degree of organization of the members within each learning list is a favorable condition of retention.

Strength of the boundary. In a more recent study of proactive inhibition, Werner¹ using learning material varying in degree of organization found that strengthening the boundary; that is, the topical organization of the material, lessened the number of intrusions or displacement of dis-

¹H. Werner, "The Effect of Boundary Strength on Interference and Retention". American Journal of Psychology, Vol. LX, October 1947, 598-607.

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¹ E. Peterson, "The Effect of Boundary Strength on Interference and Retention," American Journal of Psychology, Vol. LX, October 1945, 558-567.

crete items in reproduction. He further states that a stronger boundary was required to prevent massing or de-differentiation of items, i.e., loss of distinctiveness of the memory traces, than to prevent intrusions. This is a modification of the X factor postulated by Minimi and Dallenbach¹ who considered it as simply an anti-consolidation factor responsible for interference in the formation of the memory traces. On the basis of his study, Werner states that Melton's² hypothesis, according to which Factor X in retroactive inhibition is the unlearning of the original list during the learning of the interpolated list, is not an adequate explanation. Using numerical data in graphs and pictorial charts, Vernon³ found with 231 adult subjects that unless the subject had:..."clear-cut, well organized interrelated systems of the ideas dealt with in the data... the information was, ignored, forgotten, isolated, transferred and fitted into irrational and

¹H. Minimi and K. M. Dallenbach, "The Effect of Activity Upon Learning and Retention in the Cockroach". American Journal of Psychology, 59, 1946, 1-58.

²A. W. Melton and J. M. Irwin, "The Influence of the Degree of Interpolated Learning in Retroactive Inhibition and the Overt Transfer of Specific Responses". American Journal of Psychology, 53, 1940, 173-203.

³M. D. Vernon, "Learning from Graphical Material." British Journal of Psychology, 1946, 36, 145-158.

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¹ E. Milner and E. M. Galanter, "The Effect of Activity upon Learning and Retention in the Laboratory," American Journal of Psychology, 52, 1944, 1-22.

² A. W. Milner and J. E. Irwin, "The Influence of the Degree of Interpolated Learning in Retroactive Inhibition and the Effect of Specific Rehearsal," American Journal of Psychology, 52, 1944, 17-20.

³ W. D. Vernon, "Learning from Graphical Material," British Journal of Psychology, 1946, 38, 145-152.

emotional opinions." Carlson and Carr,¹ in contrast to this, conclude from their study that recognition memory involves at least a rote and a logical component because individuals differ in their ability to utilize rote and logical memory.

The basic assumption of the present writer is that meaningfulness of material is a continuum on which nonsense syllables are least meaningful and the topically related words are most meaningful with the unrelated words occupying an intermediate position. Meaning, thus considered, is not a new element added to some material and lacking in others but a principle which organizes the material and furthermore must coincide with some inner tendency of the learner which causes him to favor meaningful material and resist that which lacks meaning for him. Since meaning may be discovered in the learning of nonsense material there can be no sharp demarcation between rote and logical learning. The use of the related word list in this study reflects an attempt to explore the bearing on retention of topical organization of the verbal material. This topical or "logical" organization, it is

¹H. B. Carlson and H. A. Carr, "Rote and Logical Recognition Memory", Journal of Experimental Psychology, 1940, 26, 199-210.

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The basic assumption of the present writer is that meaningfulness of material is a continuum on which non-sense syllables are least meaningful and the logically related words are most meaningful with the unrelated words occupying an intermediate position. Learning, thus considered, is not a new element added to some material and lacking in others but a principle which organizes the material and furthermore must coincide with some inner tendency of the learner which causes him to favor meaningful material and reject that which lacks meaning for him. Since meaning may be discovered in the learning of nonsense material there can be no sharp distinction between rote and logical learning. The use of the related word list in this study reflects an attempt to explore the learning on retention of logical organization of the verbal material. This logical or "logical" organization, it is

believed, should provide the element of "belonging", "boundary strength", and, relatively strong intraserial cohesion. By using a word list to study the influence of topical organization quantitative units are retained. These units being comparable to the units of the other lists used (nonsense syllables and unrelated words) makes it possible to compare directly the retention of the three types of material learned under equivalent conditions, and measured at identical intervals and by the same methods.

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CHAPTER III

SUBJECTS, MATERIALS AND TECHNIQUES

I. SUBJECTS

Number and maturity level. The study included both individual and group experiments. The subjects were 446 college students in classes of psychology extending through three semesters and summer school. Forty-four of the fifty subjects who participated in the main individual experiment, were women students in the Boston University School of Nursing. This group represented about 90% of the total enrollment in one psychology course. The subjects for the group experiments were students in the School of Education and the College of Liberal Arts. Of the total, 163 were men, 283 were women. It is assumed that these subjects are representative of the college population.

II. LEARNING MATERIALS

Three lists of verbal material varying in degree of meaning. The syllables selected for the non-sense material were the Ebbinghaus type consisting of two consonants with a vowel between which do not make a sense word. The individual syllables form no apparent pattern and have no obvious meaning, although it is recognized that nonsense

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Description of the sample. The individuals who participated in the group experiments were members of Psychology of Learning, a required course. In these classes were enrolled students from the School of Education, College of Liberal Arts, College of Practical Arts and Letters, School of Nursing, College of Business Administration and School of Music. The sample also included part-time students, most of whom were teachers. There was a wide age range represented, varying from twenty to fifty years. The scholastic level extended from college sophomores to advanced graduate students. These groups were considered to represent an adequate sampling of the Boston University population.

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syllables vary in associative value. The second list contained 20 two-syllable meaningful nouns. These were common words but lacked any topical or organized sequence. The third list contained topically or "logically" related words. They represented common household articles, i.e. furniture, linen and bedding. The individual units of this third list were probably no more familiar than those in the second list but they had a strong intraserial relationship which those in the second list lacked. The three lists follow:

Nonsense Syllables	Unrelated Words	Related Words
zab	shoreline	table
bix	temper	chair
yod	bishop	seat
dib	cluster	stool
bij	business	divan
zec	dreamer	settee
hef	captain	davenport
dap	market	sofa
kib	ashes	lounge
leb	uncle	bench
pim	divorce	bunk
nof	leather	bed
rad	pasture	mattress
woj	offence	springs
sef	jacket	linen
wez	turnip	sheet
	dessert	pillow
	affront	quilt
	steamer	dresser
	thistle	bureau

The number of items from these lists used in the various experiments differed as indicated in the descriptions of the experimental procedures.

III EXPERIMENTAL PROCEDURES

Experiment I: Preliminary. The first phase of this study was exploratory in nature. An attempt was made to find learning tasks for the three kinds of material that would be equal in difficulty. A learning period of five minutes was chosen and the number of items from each list that could be learned completely in that time was found. In the usual procedure for complete mastery a list of given length is presented and the subject continues to study it until he can reproduce all the items in correct serial order. The score then is the total time or number of repetitions required for mastery. It was necessary, therefore, to modify the usual procedure in order to determine first how many items were completely mastered in the adopted five-minute period. The method devised for this purpose was called the "progressive mastery" method. The procedure under this method was as follows: Experimenter (E) presents the first word (or syllable). Subject (S) pronounces it aloud. E presents the second word. S pronounces it, and then repeats the first and second. E presents the third word. S pronounces it and repeats all three words in order. Then the fourth word is presented, and the process is continued. Each time a new word is presented S pronounces it and then repeats the whole list beginning

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with the first word each time. Whenever S is unable to give a word previously presented he is prompted by E, after which he again starts at the beginning of the list in his recital. The process is stopped at the end of five minutes and the number of items S correctly recited in correct serial order on the last trial is taken as the score indicating the amount completely mastered in the time allowed.

Series A. In this preliminary experiment two different ways of presenting the material were used. In series A the experimenter read aloud the words or syllables and the subject's reception was by auditory perception. After the subject was comfortably seated in a room free from distraction and interruption, E read the following instructions:

This is an experiment to determine how many words you can learn in five minutes when they are presented orally. As I pronounce each word you are to pronounce it aloud and recite in order all of the words which you have learned, including the last one. If you are unable to recall one, e.g. the fourth of the series, I will repeat it and after you pronounce it, you will begin with the first word again and recite as many as you can recall. Now I shall give you four words as a practice exercise to acquaint you with the procedure.

For those subjects who learned the unrelated or related word list first, the following syllables were used for the practice exercise: mij, fac, gov, neb. For those who learned the nonsense syllables first, the words book, pencil, paper, pen were used for practice. The subject

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For those subjects who learned the unrelated or related word list first, the following syllables were used for the practice exercise: gill, fac, fox, gaw. For those who learned the nonsense syllables first, the words book, recall, paper, pen were used for practice. The subject

then proceeded to learn each of the three lists for the five-minute period. The order in which the three lists were learned was rotated to balance the effect of practice and other variables. This was done by having one third of the subjects learn the nonsense syllables first, unrelated words second, and related words third in order. One third learned the unrelated words first, the related words second, and the nonsense syllables last. The others learned the related words first, nonsense syllables second, and the unrelated words last. In the course of the experiment the subject was prompted whenever in his recital he hesitated two seconds or indicated that he did not recall an item. Table I-A shows the amount learned by each of the fifteen subjects by auditory perception. Considerable individual variation is indicated for all three lists. The trend clearly indicated is for highest scores on the related words, and poorest scores on the nonsense syllables.

Series B. In Series B of the preliminary experiment the procedure followed was the same as that used in Series A except that the words or syllables were printed on cards and were presented so that S read them instead of hearing them pronounced. Thus visual perception was employed here in place of the auditory form used in Series A.

For each of the three lists each syllable or word

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TABLE I - A

Amount Learned in Five Minutes: Progressive Mastery

Auditory Perception

S.	N.S.	U.W.	R.W.
1	10	15	18
2	7	10	10
3	4	6	9
4	7	11	13
5	11	14	20
6	9	15	14
7	7	13	13
8	7	11	18
9	8	9	12
10	11	17	19
11	8	13	16
12	11	15	18
13	8	13	18
14	9	13	14
15	<u>8</u>	<u>12</u>	<u>16</u>
Total	125	187	228
Median	8	13	16
Mean	8.3	12.46	15.2
Range	4-11	6-17	9-20

S. - Subjects

N.S. - Nonsense Syllables

U.W. - Unrelated Words

R.W. - Related Words

Table I - A

Amount learned in five minutes: Progressive Memory

Additional Information

S.	E.S.	U.W.	P.W.
1	10	15	18
2	7	10	10
3	8	8	2
4	7	11	13
5	11	14	20
6	8	15	14
7	7	13	15
8	7	11	13
9	8	8	12
10	11	17	19
11	8	13	16
12	10	13	18
13	8	15	18
14	8	13	18
15	8	13	18
Total	113	137	223
Median	8	13	16
Mean	8.7	13.45	17.8
Range	4-11	8-17	2-20

E.S. - Subjects
 E.S.W. - Monkeys
 U.W. - Unrelated words
 P.W. - Related words

was printed on a 6 x 4 $\frac{1}{2}$ inch card with a tab attached at the top. On the back of this tab was printed in small letters the word appearing on the front of the card together with a number indicating its serial position. The cards were placed in a box in such a way that the experimenter could identify any card by looking at the back of the tabs without exposing the card to the view of the subject. The instructions read to the subjects were the same as in Series A except that the word "present" was used instead of "pronounce".

The results from this series, in which fifteen subjects participated, are shown in Table I-B, which gives the number of items mastered to the point of correct recital in the order presented. A comparison of Tables I-A and I-B reveals that there was very little difference for the two methods of presentation. The means show a very slight, though insignificant, advantage in favor of the visual method. The approximate numbers learned were: nine nonsense syllables, thirteen unrelated words and sixteen related words.

No tests of retention were given in Experiment I. The original plan was to use the number of items from these lists learned in this series as the learning tasks in the principal experiments on retention. But the next subjects

was printed on a 5 x 4 inch card with a tab attached at the top. On the back of this tab was printed in small letters the word appearing on the front of the card in-
 rather with a number indicating its serial position. The cards were placed in a box in such a way that the experi-
 menter could readily see each by looking at the back of the tab without exposing the card to the view of the sub-
 ject. The instructions read to the subjects were the same as in Series A except that the word "response" was used in-
 stead of "pronounce".

The results from this series, in which fifteen sub-
 jects participated, are shown in Table I-B, which gives the number of items mastered to the point of correct re-
 cital in the order presented. A comparison of Tables I-A and I-B reveals that there was very little difference for the two methods of presentation. The means show a very slight, though insignificant, advantage in favor of the visual method. The experimental numbers learned were: nine nonsense syllables, thirteen unrelated words and sixteen related words.

No tests of retention were given in Experiment I. The original plan was to use the number of items from these lists learned in this series as the learning basis in the principal experiments on retention. But the new subjects

TABLE I - B

Amount Learned in Five Minutes: Progressive Mastery

Visual Perception

S.	N.S.	U.W.	R.W.
1	4	9	11
2	9	13	16
3	12	16	20
4	10	15	18
5	11	13	16
6	9	12	17
7	10	16	15
8	7	17	16
9	6	9	9
10	9	15	17
11	6	9	13
12	8	9	14
13	12	14	20
14	12	12	17
15	<u>7</u>	<u>14</u>	<u>16</u>
Total	133	193	238
Median	9	13	16
Mean	8.9	12.8	16
Range	4-12	9-17	9-20

S. - Subjects

N.S. - Nonsense Syllables

U.W. - Unrelated Words

R.W. - Related Words

TABLE I - 2

Amount learned in five minutes: Progressive category

Visual Perception

S.	V.S.	V.P.	V.L.
1	4	8	11
2	7	12	12
3	12	12	12
4	10	12	12
5	11	12	12
6	9	12	12
7	10	12	12
8	7	12	12
9	8	8	9
10	8	12	12
11	8	9	12
12	8	9	12
13	12	14	12
14	12	12	12
15	12	12	12
16	12	12	12
17	12	12	12
18	12	12	12
Total	155	123	136
Median	8	12	12
Mean	8.9	10.8	12
Range	4-12	8-12	9-12

S. - Subjects
V.S. - Verbal Subjects
V.P. - Visual Subjects
V.L. - Verbal-Learning Subjects

tested varied so much in the time required to learn them that the learning period of five minutes was retained as the basis for comparable tasks.

Experiment II. In the experiments which followed the attempt was made to compare the retention of the three kinds of learning material. In Experiment II, the visual method of presentation was employed and fifty subjects learned all three kinds of material. E presented the words or syllables, individually to each of the fifty subjects who learned the lists by the progressive mastery method described above. The procedure followed was identical with that described in Part B of Experiment I. The number of words or syllables learned from each list to the point of complete mastery was recorded. For purposes of testing retention after two different intervals the subjects were divided into two groups of twenty-five each. Group A was tested after thirty minutes and Group B after one week. At the end of the interval the retention was measured in two ways, (1) by the method of recall, and (2) by the relearning method. After thirty minutes for Group A and after one week for Group B, the subject was first given a sheet of paper and asked to write down as many of the words or syllables as he could recall. Two minutes were allowed for this reproduction and then the paper was taken by the

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experimenter. The subject then relearned the list following the same method used in the original learning. In the recall test, retention was scored in terms of the number of items actually reproduced. The original serial order of the items was not required in the reproduction. In the relearning test the retention score was found by subtracting from five minutes the time required for relearning. The subjects relearned to the same criterion only those items learned originally in the five-minute period. The time saved in relearning gave the measure of retention. From each of these two measures of retention the percentages retained for the three lists were computed. For recall this was done by dividing the number of items recalled by the number originally learned. For relearning it was done by dividing the time saved in relearning by five minutes. This gave two measures of retention for each list learned by each subject.

The order in which the three lists were learned was rotated in the manner described for Experiment I. The second list was not learned until after retention had been measured for the first; and the third list was not learned until after retention of the second had been measured. Thus for those subjects who were tested after one week the experiment was spread over a period of four weeks.

experiment. The subject then received the list follow-
ing the same method used in the original test. In the
recall test, retention was scored in terms of the number
of items actually reproduced. The original serial order
of the items was not required in the reproduction. In
the referring test the retention score was found by sub-
tracting from five minutes the time required for refer-
ring. The subjects returned to the same condition only
those items learned originally in the five-minute period.
The time saved in referring gave the measure of retention.
From each of these two measures of retention the percent-
ages retained for the three lists were computed. For re-
call this was done by dividing the number of items recalled
by the number originally learned. For referring it was
done by dividing the time saved in referring by five min-
utes. This gave two measures of retention for each list
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measured for the first; and the third list was not learned
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Thus for those subjects who were tested after one week
the experiment was carried over a period of four weeks.

This was done to prevent interference and confusion between the three lists.

The results of this experiment and of the ones described in the following sections are given in the next chapter.

Experiment III. The third experiment was conducted on a group with 115 students as subjects. On the basis of the results obtained from Experiment I, the three lists were set up as follows: (1) 9 nonsense syllables, (2) 13 unrelated words, (3) 16 related words. These were typed on regulation $8\frac{1}{2}$ x 11 inches typing paper, one list on each sheet. A blank sheet of paper was stapled on the back of each typed sheet. These printed lists were distributed face down to the members of the class acting as subjects. On the first day one third of the group received nonsense syllables, one third received the list of unrelated words, while the remaining third received the list of related words. The papers were distributed so that along each row the order was: nonsense syllables, unrelated words, related words; nonsense syllables, unrelated words, related words, etc. In this way each student's list differed from that of the person sitting next to him on either side. After the materials had been distributed the following instructions were read to the group:

This was done to prevent interference and confusion between the three lists.

The results of this experiment and of the ones described in the following sections are given in the next chapter.

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Do not turn the page until you are told to do so. When the signal is given, turn the sheets over and study the items in the order in which they appear on the sheet. Do not write them down. Continue learning the list until I give you the signal to stop. You will be asked to reproduce as many of the words in the list as you can recall. You will be given two-and-one-half minutes to study the list. Ready. Go.

At the end of two-and-one-half minutes of study the experimenter called, "Stop", and then gave the following additional instructions:

Turn the sheet over. Write on the blank sheet all the words you can recall from the list. Keep the original list face down. Do not turn the sheets over to look at the list after you have written your reproduction. Write your name on the paper in the upper right-hand corner.

Two minutes were allowed for this reproduction. After that the papers were collected and the regular class work was resumed.

This procedure was carried out in two class groups. For one group shortly before thirty minutes had passed blank sheets of paper were passed out, one to each student. At exactly thirty minutes from the close of the test period following the learning of the lists, the subjects were told to write down a second time all the words (or syllables) they could recall from the list they had studied. The number of items reproduced in the test given immediately after the two-and-one-half minutes spent in learning the lists was taken as the measure of

Do not turn the page until you are told to do so.
When the signal is given, turn the sheets over and
study the items in the list to which they appear
on the sheet. Do not write down anything.
Learning the list until I give you the signal to
stop. You will be asked to reproduce as many of
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be given two-and-one-half minutes to study the
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At the end of two-and-one-half minutes of study the ex-
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Turn the sheet over. Write on the blank sheet
all the words you can recall from the list.
Keep the original list face down. Do not turn
the sheets over to look at the list after you
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on the paper in the upper right-hand corner.

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words (or syllables) they could recall from the list they
had studied. The number of items remembered in the test
given immediately after the two-and-one-half minutes
spent in learning the lists was taken as the measure of

the amount learned. The reproduction on the second test given after the thirty-minute interval served as the measure of retention for that interval. The difference between the score on the immediate test and the thirty-minute test was taken as the measure of the amount forgotten during that interval. The per cent retained was calculated by dividing the score on the second test by the score on the first test. The results are reported in the next chapter.

The procedure in the second group made up of members of another class was exactly the same as for the first group, except that the retention test was given the following day. Their second test provided a measure of retention for a twenty-four-hour interval.

The experiment was continued in both groups on subsequent days. The whole procedure was repeated with a plan of rotation of learning materials to distribute practice effects, variations in attitude, and other factors equally over the three types of material. Thus the group that had nonsense syllables the first day had unrelated words in the second phase, and related words in the third phase of the experiment. Those who had unrelated words first had related words second and nonsense syllables third. Those who had the related words on the first day, had nonsense

the second test. The retention on the second test
given after the thirty-minute interval served as the
measure of retention for that interval. The difference
between the score on the second test and the thirty-
minute test was taken as the measure of the twenty-four-
hour retention interval. The average retention was
calculated by dividing the score on the second test by the
score on the first test. The results are reported in the

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second phase, and related words in the third phase of the
experiment. Those who had unrelated words first had re-
lated words second and nonsense syllables third. Those
who had the related words on the first day, had nonsense

syllables in the second lap of the experiment and unrelated words in the third.

The subjects were asked not to rehearse the material for the second recall test and to indicate on their recall sheet if they had. The subjects did not know on the initial list that they were to be tested later on the same material.

Only the results from subjects who learned and reproduced all three lists were used throughout. This meant that the records of a considerable number of participants who learned only one or two of the lists were not used. The learning-retention periods for the different lists did not overlap or run concurrently in any part of the study. The second list was learned only after the retention test for the first had been given, and the third list was not learned until after the final test for the second list had been given.

Experiment IV. In the fourth experiment of the study the learning period was reduced to two minutes because a large number of subjects in Experiment III had learned the complete list of related words in two-and-one-half minutes. Otherwise the procedure was identical with the procedure used in Experiment III, except that retention was measured after intervals of thirty minutes, forty-eight hours, and

syllables in the second list of the experiment and were-

listed words in the third.

The subjects were asked not to rehearse the material

for the second recollection and to indicate on their recall

sheet if they had. The subjects did not know on the list-

that list that they were to be tested later on the same

material.

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Otherwise the procedure was identical with the procedure

used in Experiment III, except that retention was measured

after intervals of thirty minutes, forty-eight hours, and

one week. A different group of subjects was used for each of the three intervals. The number of subjects participating in Experiment IV was 109. These subjects were distributed as follows: 29 in the thirty-minute group, 22 in the forty-eight-hour group and 58 in the one-week group.

Experiment V. The procedure for the fifth experiment was the same as for the preceding one except for a difference in the lists used for learning. In this experiment the lists were equal in length. Whereas in the fourth experiment there were nine nonsense syllables, thirteen unrelated words, and sixteen related words, in this experiment there were sixteen nonsense syllables, sixteen unrelated words and sixteen related words. The syllables used were those listed at the beginning of this chapter. The words used were the first sixteen of the two word lists shown on the same page.

A total of 142 subjects, all college students, participated in this series. These were divided into three groups to provide for measures of retention after intervals of thirty minutes, forty-eight hours, and one week. There were 49 subjects in the thirty-minute group, 30 in the forty-eight-hour group, and 63 in the one-week group. Only the records for those subjects who learned and were

one week. A different group of subjects was used for each of the three intervals. The number of subjects participating in Experiment IV was 108. These subjects were distributed as follows: 32 in the thirty-minute group, 32 in the forty-eight-hour group and 44 in the one-week group.

Experiment V. The procedure for the fifth experiment was the same as for the preceding one except for a difference in the lists used for learning. In this experiment the lists were equal in length. Words in the twenty experiment there were nine nonsense syllables, fifteen unrelated words, and sixteen related words. In this experiment there were sixteen nonsense syllables, sixteen unrelated words and sixteen related words. The syllables used were those listed at the beginning of this chapter. The words used were the first sixteen of the two word lists shown on the same page.

A total of 148 subjects, all college students, participated in this series. These were divided into three groups to provide for measures of retention after intervals of thirty minutes, forty-eight hours, and one week. There were 48 subjects in the thirty-minute group, 32 in the forty-eight-hour group, and 68 in the one-week group. Only the records for those subjects who learned and were

tested on all three lists were used. The learning time was two minutes for all three lists, and two minutes were allowed for the immediate test and for the retention test.

In Experiment IV the attempt was made to equate the difficulty of the learning tasks for the three types of learning material studied by keeping the learning time constant and by varying the lengths of the lists in accordance with the different amounts of the three kinds of material completely learned in the five-minute period used in the preliminary experiment. The method of retained members was used to measure retention. It was, therefore, necessary to use a much shorter learning time in order to avoid complete mastery and overlearning. For that reason the two-minute period for learning was used. It seemed desirable, however, to explore the differences in retention of the three types of material by using equal-length lists to see if the two procedures for equating the learning tasks would make any difference in the relative percentages retained. This was done in Experiment V.

It is recognized that in group experiments, such as Experiments III, IV, and V, it is impossible to secure as good control of conditions as is possible in individual experiments. There are many uncontrolled variables which enter into the experimental situation. Among these are the

tested on all three days were used. The learning time was two minutes for all three days, and two minutes were allowed for the immediate test and for the retention test. In Experiment IV the attempt was made to remove the difficulty of the learning task by using three types of learning material divided by varying the learning time constant and by varying the form of the data in memory. Since with the different amounts of the three kinds of material exclusively learned in the five-minute period used in the preliminary experiment. The method of retained members was used to measure retention. It was, of course, necessary to use a much shorter learning time in order to avoid complete mastery and memorization. For that reason the two-minute period for learning was used. It seemed desirable, however, to analyze the different types of retention of the three types of material by using equal-length lists to see if the two procedures for comparing the learning tasks would make any difference in the relative percentages retained. This was done in Experiment V. It is recommended that in group experiments, such as Experiments III, IV, and V, it is impossible to secure as good control of conditions as is possible in individual experiments. There are many uncontrolled variables which enter into the experimental situation. Among these are the

variation in attention, interest, attitudes, age, desire to co-operate, intelligence, and physical conditions of the subjects. Where an experimental study is spread over

EXPERIMENT II GROUP A
1. Learning scores. Experiment I was exploratory in nature to determine the procedure to be followed in the main investigation. Tables I-A and I-B (see Chapter III) contain the raw scores of the thirty subjects who participated. Table II contains the learning scores and thirty-minute written recall scores of the twenty-five subjects whose records were used. It is believed, however, that because of the rotating procedures used in these experiments and because of the fact that every subject whose records were used learned all three types of material, the uncontrolled variables are distributed uniformly enough over the three types of material to make the comparison of the retention scores and percentages valid.

preliminary study which were NS 8.6, UW 12.63 and RW 13.6. Although there are marked individual variations - ten of the twenty-five subjects learned as many or more NS than one learned RW - the mean scores of the first 20 Ss vary only slightly from those of the 25 Ss, which suggests a representative sampling. The degree of variability and the range are largest for the RW and smallest for NS.

2. Retention scores. (a) written recall. As shown in Table II, the mean scores for written recall after an interval of thirty minutes was for the three lists NS 5.68, UW 11.2, RW 15.32. The difference in variability here is relatively small as shown by the standard deviations.

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to co-operate, intelligence, and physical condition of
the subjects. Where an experimental study is spread over
a period of time, as this one was, there may be fluctua-
tions in some of these factors from one part of the study
to another in the same subject. It is believed, however,
that because of the rotating procedure used in these
experiments and because of the fact that every subject
whose records were used learned all three types of mate-
rial, the uncontrolled variables are distributed uni-
formly enough over the three types of material to make
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valid.

CHAPTER IV

EXPERIMENTAL RESULTS

EXPERIMENT II GROUP A

1. Learning scores. Experiment I was exploratory in nature to determine the procedure to be followed in the main investigation, Tables I-A and I-B (see Chapter III) contain the raw scores of the thirty subjects who participated. Table II contains the learning scores and thirty-minute written recall scores of the twenty-five subjects tested individually in Experiment II. The mean learning scores were NS 8.2, UW 13.36, and RW 15.88. These follow very closely the pattern of the results obtained in the preliminary study which were NS 8.6, UW 12.63 and RW 15.6. Although there are marked individual variations - ten of the twenty-five subjects learned as many or more NS than one learned RW - the mean scores of the first 20 Ss vary only slightly from those of the 25 Ss, which suggests a representative sampling. The degree of variability and the range are largest for the RW and smallest for NS.

2. Retention scores. (a) written recall. As shown in Table II, the mean scores for written recall after an interval of thirty minutes was for the three lists NS 5.68, UW 11.2, RW 15.32. The difference in variability here is relatively small as shown by the standard deviations.

CHAPTER IV
EXPERIMENTAL RESULTS

EXPERIMENT II GROUP A

1. Learning scores. Experiment I was exploratory in nature to determine the procedure to be followed in the main investigation, Tables I-A and I-B (see Chapter III) contain the raw scores of the thirty subjects who participated. Table II contains the learning scores and thirty-minute written recall scores of the twenty-five subjects tested individually in Experiment II. The mean learning scores were NS 8.8, UW 12.36, and RW 15.88. These follow very closely the pattern of the results obtained in the preliminary study which were NS 8.6, UW 12.63 and RW 15.6. Although there are marked individual variations - ten of the twenty-five subjects learned as many or more NS than one learned RW - the mean scores of the first 20 NS vary only slightly from those of the 25 NS, which suggests a representative sampling. The degree of variability and the range are largest for the RW and smallest for NS.

2. Retention scores. (a) written recall. As shown in Table II, the mean scores for written recall after an interval of thirty minutes was for the three lists NS 5.68, UW 11.2, RW 15.32. The difference in variability here is relatively small as shown by the standard deviations.

(b) Relearning. TABLE II

Experiment II Group A Thirty-Minute Interval
 Five-Minute Learning Time The mean of the
 saving score Amount Learned Amount Recalled

S.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
1	6	8	9	2	3	9
2	9	13	16	9	13	16
3	7	16	14	5	15	14
4	9	13	16	7	11	15
5	7	13	15	3	9	13
6	8	14	20	5	13	20
7	7	12	16	7	10	16
8	8	15	16	6	12	14
9	7	15	20	2	11	20
10	8	13	18	8	12	18
11	9	12	16	5	11	16
12	5	12	16	2	9	15
13	9	11	16	7	9	16
14	8	14	14	3	11	13
15	8	13	13	7	11	12
16	8	15	15	5	11	13
17	9	14	17	3	12	15
18	10	14	20	10	12	20
19	10	16	15	6	15	15
20	12	17	16	12	17	16
Total	164	270	318	114	227	306
Mean	8.2	13.5	15.90	5.7	11.35	15.5
21	9	15	17	6	15	17
22	8	12	16	4	9	16
23	7	10	14	3	7	12
24	9	15	18	8	15	18
25	8	12	14	7	7	14
Total	205	334	397	142	280	383
Median	8	13	16	6	11	15
Mean	8.2	13.36	15.88	5.68	11.2	15.32
S.D.	1.39	1.98	2.32	2.48	2.99	2.60

Correlation: Amount Learned With Amount Recalled

N.S.	U.W.	R.W.
.77	.87	.98

TABLE II

Experiment II Group A Fifty-Minute Interval
Five-Minute Learning Time

Amount Learned		Amount Recalled	
N.S.	U.W.	N.S.	U.W.
1	8	2	3
2	9	3	13
3	7	4	13
4	9	5	13
5	7	6	11
6	8	7	9
7	7	8	13
8	8	9	10
9	7	10	11
10	8	11	12
11	9	12	12
12	8	13	11
13	9	14	9
14	8	15	11
15	9	16	11
16	8	17	11
17	9	18	12
18	8	19	13
19	9	20	13
20	8	21	13
21	9	22	13
22	8	23	13
23	9	24	13
24	8	25	13
25	9	26	13
26	8	27	13
27	9	28	13
28	8	29	13
29	9	30	13
30	8	31	13
31	9	32	13
32	8	33	13
33	9	34	13
34	8	35	13
35	9	36	13
36	8	37	13
37	9	38	13
38	8	39	13
39	9	40	13
40	8	41	13
41	9	42	13
42	8	43	13
43	9	44	13
44	8	45	13
45	9	46	13
46	8	47	13
47	9	48	13
48	8	49	13
49	9	50	13
50	8	51	13
51	9	52	13
52	8	53	13
53	9	54	13
54	8	55	13
55	9	56	13
56	8	57	13
57	9	58	13
58	8	59	13
59	9	60	13
60	8	61	13
61	9	62	13
62	8	63	13
63	9	64	13
64	8	65	13
65	9	66	13
66	8	67	13
67	9	68	13
68	8	69	13
69	9	70	13
70	8	71	13
71	9	72	13
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160	8	161	13
161	9	162	13
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164	8	165	13
165	9	166	13
166	8	167	13
167	9	168	13
168	8	169	13
169	9	170	13
170	8	171	13
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187	9	188	13
188	8	189	13
189	9	190	13
190	8	191	13
191	9	192	13
192	8	193	13
193	9	194	13
194	8	195	13
195	9	196	13
196	8	197	13
197	9	198	13
198	8	199	13
199	9	200	13

Correlation: Amount Learned With Amount Recalled

N.S.	U.W.	N.S.	U.W.
77	87	77	87
87	77	87	77

(b) Relearning. The time saved in seconds for re-learning the lists after thirty minutes and the number of promptings required appear in Table III. The mean of the saving scores for the three lists are NS 234.8 seconds, UW 209 seconds, and RW 269.4 seconds, with corresponding S.D.s of 56.7 seconds, 72.8 seconds and 34.34 seconds. The fewest promptings were required for relearning the RW, while the UW required more promptings than the NS. The range and variability are also greatest for the UW both in time saved and in the number of promptings.

(c) Percentage of retentions. Table IV clearly portrays the significance of the measure used in determining the amount retained. Written recall yielded percentage retention scores as follows: NS 67.04 per cent, UW 82.44 per cent and RW 96.32 per cent, while the time saved in relearning after thirty minutes was for NS 78.20 per cent, for UW 69.52 per cent and for RW 89.76 per cent. This same trend was apparent in the variability as measured by the S.D.s of the scores which were for recall NS 23.83, UW 11.09, and RW 5.1 (for recall) while for time saved they were NS 18.83, UW 24.58 and RW 14.89. Thus the NS which was lowest on the scale when measured by recall was in second place when measured by time saved in relearning. The RW list showed the highest retention by both measures

(b) Relearning. The time saved in seconds for re-learning the lists after thirty minutes and the number of promptings required appear in Table III. The mean of the saving scores for the three lists are NS 234.8 seconds, UW 209 seconds, and RW 229.4 seconds, with corresponding S.D.s of 56.7 seconds, 78.6 seconds and 34.54 seconds. The fewest promptings were required for relearning the RW, while the UW required more promptings than the NS. The range and variability are also greatest for the UW both in time saved and in the number of promptings.

(c) Percentage of retention. Table IV clearly portrays the significance of the measure used in determining the amount retained. Written recall yielded percentage retention scores as follows: NS 67.04 per cent, UW 52.44 per cent and RW 56.32 per cent, while the time saved in relearning after thirty minutes was for NS 73.20 per cent, for UW 63.32 per cent and for RW 59.76 per cent. This same trend was apparent in the variability as measured by the S.D.s of the scores which were for recall NS 23.83, UW 11.09, and RW 5.1 (for recall) while for time saved they were NS 18.83, UW 24.58 and RW 14.29. Thus the NS which was lowest on the scale when measured by recall was in second place when measured by time saved in relearning. The RW list showed the highest retention by both measures

TABLE III

Experiment II Group A Thirty-Minute Interval

Five-Minute Learning Time

Relearning

Time Saved In Seconds				Number Of Promptings		
S.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
1	240	-10	145	3	11	4
2	220	300	210	1	0	1
3	280	260	270	1	2	0
4	280	125	255	1	5	1
5	220	100	255	5	5	1
6	270	240	270	1	1	0
7	280	250	300	0	1	0
8	265	180	275	2	5	1
9	250	220	280	4	3	0
10	300	245	300	0	1	0
11	270	265	275	3	1	0
12	225	180	275	4	3	0
13	240	115	265	0	4	2
14	150	210	235	7	2	2
15	275	265	270	1	2	0
16	240	165	265	3	4	2
17	225	235	265	4	3	0
18	300	270	285	0	2	0
19	150	250	300	3	1	0
20	300	260	300	0	0	0
21	80	300	300	5	0	0
22	120	110	300	6	5	0
23	195	180	240	4	5	2
24	215	300	300	2	0	0
25	280	200	300	1	7	0
Total	5870	5225	6735	61	73	16
Median	240	235	275	2	2	0
Mean	234.8	209	269.4	2.44	2.92	.64
S.D.	56.7	72.8	34.34	2	2.54	1.02

TABLE III
Experiment II Group A Thirty-minute Interval
Five-minute Learning Time
Helixina

Time Saved in Seconds		Number of Promptings			
N.S.	W.	N.S.	W.	N.S.	W.
1	145	3	11	4	
2	200	1	0	1	
3	280	1	2	0	
4	195	1	8	1	
5	100	5	5	1	
6	240	7	1	0	
7	280	0	1	0	
8	180	3	3	1	
9	280	4	3	0	
10	245	0	1	0	
11	275	0	1	0	
12	170	4	3	0	
13	175	0	4	2	
14	210	7	2	3	
15	275	1	3	0	
16	185	5	4	2	
17	285	4	3	0	
18	270	0	3	0	
19	280	3	1	0	
20	240	0	0	0	
21	200	5	0	0	
22	175	4	3	2	
23	180	3	0	0	
24	200	3	0	0	
25	200	1	7	0	
Total	5225	51	75	16	
Median	245	3	3	0	
Mean	209.8	3.44	3.33	1.02	
S.D.	76.8	2	3.24		

TABLE IV

Experiment II Group A Thirty-Minute Interval

Five-Minute Learning Time

	Percent Recalled			Percent Time Saved		
S. Score is	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
1	33	37	100	80	-3	48
2	100	100	100	73	100	70
3	71	94	100	93	87	90
4	77	85	94	93	42	85
5	42	69	87	73	33	85
6	62	93	100	90	80	90
7	100	83	100	93	83	100
8	75	80	87	88	60	92
9	29	73	100	83	73	93
10	100	92	100	100	82	100
11	55	92	100	90	88	92
12	40	75	94	75	60	92
13	78	82	100	80	38	88
14	37	79	93	50	70	78
15	87	85	92	92	88	90
16	62	73	87	80	55	88
17	33	86	88	75	78	88
18	100	86	100	100	90	95
19	60	94	100	50	83	100
20	100	100	100	100	87	100
21	67	100	100	27	100	100
22	50	75	100	40	37	100
23	42	70	86	65	60	80
24	88	100	100	72	100	100
25	<u>88</u>	<u>58</u>	<u>100</u>	<u>93</u>	<u>67</u>	<u>100</u>
Total	1676	2061	2408	1955	1738	2244
Median	67	85	100	80	78	92
Mean	67.04	82.44	96.32	78.2	69.52	89.76
S.D.	23.83	11.09	5.10	18.83	24.58	14.89

TABLE IV

Experiment II		Group A		Group B		Group C		Group D		Group E		Group F		Group G		Group H		Group I		Group J		Group K		Group L		Group M		Group N		Group O		Group P		Group Q		Group R		Group S		Group T		Group U		Group V		Group W		Group X		Group Y		Group Z		Group AA		Group AB		Group AC		Group AD		Group AE		Group AF		Group AG		Group AH		Group AI		Group AJ		Group AK		Group AL		Group AM		Group AN		Group AO		Group AP		Group AQ		Group AR		Group AS		Group AT		Group AU		Group AV		Group AW		Group AX		Group AY		Group AZ		Group BA		Group BB		Group BC		Group BD		Group BE		Group BF		Group BG		Group BH		Group BI		Group BJ		Group BK		Group BL		Group BM		Group BN		Group BO		Group BP		Group BQ		Group BR		Group BS		Group BT		Group BU		Group BV		Group BW		Group BX		Group BY		Group BZ		Group CA		Group CB		Group CC		Group CD		Group CE		Group CF		Group CG		Group CH		Group CI		Group CJ		Group CK		Group CL		Group CM		Group CN		Group CO		Group CP		Group CQ		Group CR		Group CS		Group CT		Group CU		Group CV		Group CW		Group CX		Group CY		Group CZ		Group DA		Group DB		Group DC		Group DD		Group DE		Group DF		Group DG		Group DH		Group DI		Group DJ		Group DK		Group DL		Group DM		Group DN		Group DO		Group DP		Group DQ		Group DR		Group DS		Group DT		Group DU		Group DV		Group DW		Group DX		Group DY		Group DZ		Group EA		Group EB		Group EC		Group ED		Group EE		Group EF		Group EG		Group EH		Group EI		Group EJ		Group EK		Group EL		Group EM		Group EN		Group EO		Group EP		Group EQ		Group ER		Group ES		Group ET		Group EU		Group EV		Group EW		Group EX		Group EY		Group EZ		Group FA		Group FB		Group FC		Group FD		Group FE		Group FF		Group FG		Group FH		Group FI		Group FJ		Group FK		Group FL		Group FM		Group FN		Group FO		Group FP		Group FQ		Group FR		Group FS		Group FT		Group FU		Group FV		Group FW		Group FX		Group FY		Group FZ		Group GA		Group GB		Group GC		Group GD		Group GE		Group GF		Group GG		Group GH		Group GI		Group GJ		Group GK		Group GL		Group GM		Group GN		Group GO		Group GP		Group GQ		Group GR		Group GS		Group GT		Group GU		Group GV		Group GW		Group GX		Group GY		Group GZ		Group HA		Group HB		Group HC		Group HD		Group HE		Group HF		Group HG		Group HI		Group HJ		Group HK		Group HL		Group HM		Group HN		Group HO		Group HP		Group HQ		Group HR		Group HS		Group HT		Group HU		Group HV		Group HW		Group HX		Group HY		Group HZ		Group IA		Group IB		Group IC		Group ID		Group IE		Group IF		Group IG		Group IH		Group II		Group IJ		Group IK		Group IL		Group IM		Group IN		Group IO		Group IP		Group IQ		Group IR		Group IS		Group IT		Group IU		Group IV		Group IW		Group IX		Group IY		Group IZ		Group JA		Group JB		Group JC		Group JD		Group JE		Group JF		Group JG		Group JH		Group JI		Group JJ		Group JK		Group JL		Group JM		Group JN		Group JO		Group JP		Group JQ		Group JR		Group JS		Group JT		Group JU		Group JV		Group JW		Group JX		Group JY		Group JZ		Group KA		Group KB		Group KC		Group KD		Group KE		Group KF		Group KG		Group KH		Group KI		Group KJ		Group KK		Group KL		Group KM		Group KN		Group KO		Group KP		Group KQ		Group KR		Group KS		Group KT		Group KU		Group KV		Group KW		Group KX		Group KY		Group KZ		Group LA		Group LB		Group LC		Group LD		Group LE		Group LF		Group LG		Group LH		Group LI		Group LJ		Group LK		Group LM		Group LN		Group LO		Group LP		Group LQ		Group LR		Group LS		Group LT		Group LU		Group LV		Group LW		Group LX		Group LY		Group LZ		Group MA		Group MB		Group MC		Group MD		Group ME		Group MF		Group MG		Group MH		Group MI		Group MJ		Group MK		Group ML		Group MM		Group MN		Group MO		Group MP		Group MQ		Group MR		Group MS		Group MT		Group MU		Group MV		Group MW		Group MX		Group MY		Group MZ		Group NA		Group NB		Group NC		Group ND		Group NE		Group NF		Group NG		Group NH		Group NI		Group NJ		Group NK		Group NL		Group NM		Group NN		Group NO		Group NP		Group NQ		Group NR		Group NS		Group NT		Group NU		Group NV		Group NW		Group NX		Group NY		Group NZ		Group OA		Group OB		Group OC		Group OD		Group OE		Group OF		Group OG		Group OH		Group OI		Group OJ		Group OK		Group OL		Group OM		Group ON		Group OO		Group OP		Group OQ		Group OR		Group OS		Group OT		Group OU		Group OV		Group OW		Group OX		Group OY		Group OZ		Group PA		Group PB		Group PC		Group PD		Group PE		Group PF		Group PG		Group PH		Group PI		Group PJ		Group PK		Group PL		Group PM		Group PN		Group PO		Group PP		Group PQ		Group PR		Group PS		Group PT		Group PU		Group PV		Group PW		Group PX		Group PY		Group PZ		Group QA		Group QB		Group QC		Group QD		Group QE		Group QF		Group QG		Group QH		Group QI		Group QJ		Group QK		Group QL		Group QM		Group QN		Group QO		Group QP		Group QQ		Group QR		Group QS		Group QT		Group QU		Group QV		Group QW		Group QX		Group QY		Group QZ		Group RA		Group RB		Group RC		Group RD		Group RE		Group RF		Group RG		Group RH		Group RI		Group RJ		Group RK		Group RL		Group RM		Group RN		Group RO		Group RP		Group RQ		Group RR		Group RS		Group RT		Group RU		Group RV		Group RW		Group RX		Group RY		Group RZ		Group SA		Group SB		Group SC		Group SD		Group SE		Group SF		Group SG		Group SH		Group SI		Group SJ		Group SK		Group SL		Group SM		Group SN		Group SO		Group SP		Group SQ		Group SR		Group SS		Group ST		Group SU		Group SV		Group SW		Group SX		Group SY		Group SZ		Group TA		Group TB		Group TC		Group TD		Group TE		Group TF		Group TG		Group TH		Group TI		Group TJ		Group TK		Group TL		Group TM		Group TN		Group TO		Group TP		Group TQ		Group TR		Group TS		Group TT		Group TU		Group TV		Group TW		Group TX		Group TY		Group TZ		Group UA		Group UB		Group UC		Group UD		Group UE		Group UF		Group UG		Group UH		Group UI		Group UJ		Group UK		Group UL		Group UM		Group UN		Group UO		Group UP		Group UQ		Group UR		Group US		Group UT		Group UV		Group UW		Group UX		Group UY		Group UZ		Group VA		Group VB		Group VC		Group VD		Group VE		Group VF		Group VG		Group VH		Group VI		Group VJ		Group VK		Group VL		Group VM		Group VN		Group VO		Group VP		Group VQ		Group VR		Group VS		Group VT		Group VU		Group VV		Group VW		Group VX		Group VY		Group VZ		Group WA		Group WB		Group WC		Group WD		Group WE		Group WF		Group WG		Group WH		Group WI		Group WJ		Group WK		Group WL		Group WM		Group WN		Group WO		Group WP		Group WQ		Group WR		Group WS		Group WT		Group WU		Group WV		Group WY		Group WZ		Group XA		Group XB		Group XC		Group XD		Group XE		Group XF		Group XG		Group XH		Group XI		Group XJ		Group XK		Group XL		Group XM		Group XN		Group XO		Group XP		Group XQ		Group XR		Group XS		Group XT		Group XU		Group XV		Group XW		Group XX		Group XY		Group XZ		Group YA		Group YB		Group YC		Group YD		Group YE		Group YF		Group YG		Group YH		Group YI		Group YJ		Group YK		Group YL		Group YM		Group YN		Group YO		Group YP		Group YQ		Group YR		Group YS		Group YT		Group YU		Group YV		Group YW		Group YX		Group YY		Group YZ		Group ZA		Group ZB		Group ZC		Group ZD		Group ZE		Group ZF		Group ZG		Group ZH		Group ZI		Group ZJ		Group ZK		Group ZL		Group ZM		Group ZN		Group ZO		Group ZP		Group ZQ		Group ZR		Group ZS		Group ZT		Group ZU		Group ZV		Group ZW		Group ZX		Group ZY		Group ZZ	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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and the least variability in both. One subject showed a loss of three per cent in relearning the unrelated list. This being an exceptional case would tend to lower the mean for the retention of the UW. However, the median score is also less than the mean for NS.

Correlation. The correlation between the amount learned and the amount recalled after thirty minutes was high for all three types of material NS .77, NW .87 and RW .98.

EXPERIMENT II GROUP B

1. Learning scores. Table V contains the scores in items learned and recalled after one week by 25 individually tested subjects. Comparison of the mean number of items learned from each list by this group with the corresponding figure in Table II shows that in learning these subjects were slightly below the members of Group A on all three lists. Their mean scores were NS 7.44, UW 12.48, and RW 15.24 as against NS 8.2, UW 13.36 and RW 15.88 for Group A. The variability in this case as measured by the S.D. was greatest for the RW list.

2. Retention scores. (a) recall. The mean number of items recalled were NS 2.4, UW 7.4, and RW 13.08. The S.D. of the recall scores was lowest for NS and greatest for the UW list.

and the least variability in both. One subject showed a loss of three per cent in retaining the unrelated list. This being an exceptional case would tend to lower the mean for the retention of the UW. However, the median score is also less than the mean for NS.

Correlation. The correlation between the amount learned and the amount recalled after thirty minutes was high for all three types of material NS .77, NW .87 and RW .98.

EXPERIMENT II GROUP B

1. Learning scores. Table V contains the scores in items learned and recalled after one week by 28 individually tested subjects. Comparison of the mean number of items learned from each list by this group with the corresponding figure in Table II shows that in learning these subjects were slightly below the members of Group A on all three lists. Their mean scores were NS 7.44, UW 12.48, and RW 15.24 as against NS 8.8, UW 13.38 and RW 16.88 for Group A. The variability in this case as measured by the S.D. was greatest for the RW list.

2. Retention scores. (a) recall. The mean number of items recalled were NS 8.4, UW 7.4, and RW 13.08. The S.D. of the recall scores was lowest for NS and greatest for the UW list.

(b) Relearning. TABLE V shows the retention for the

Experiment II Group B One-Week Interval
 Five-Minute Learning Time
 Amount Learned Amount Recalled

S.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
1	10	12	17	2	11	13
2	9	12	16	1	4	15
3	5	8	10	1	3	9
4	7	10	15	1	4	12
5	7	14	17	3	13	16
6	6	9	12	1	6	11
7	8	14	16	1	7	14
8	6	12	18	1	11	17
9	8	13	17	2	7	12
10	6	12	18	1	7	18
11	7	13	18	4	11	18
12	6	12	16	3	2	12
13	6	11	16	5	9	16
14	8	16	17	2	9	15
15	7	12	17	1	7	15
16	9	11	16	4	6	10
17	8	14	13	3	3	11
18	7	13	11	1	8	9
19	7	13	14	4	11	9
20	7	14	14	2	4	11
21	6	14	13	1	5	11
22	8	13	14	3	3	11
23	9	14	13	7	11	13
24	9	15	18	2	14	16
25	10	11	15	4	9	13
Total	186	312	381	60	185	327
Median	7	13	16	2	7	13
Mean	7.44	12.48	15.24	2.4	7.4	13.08
S.D.	1.77	1.79	2.23	1.18	3.95	2.72

Correlation: Amount Learned With Amount Recalled

N.S. U.W. R.W.
 .32 .30 .81

TABLE V

Experiment II Group 2 One-Week Interval

Five-Minute Learning Time

Amount Learned Amount Recalled

S.	N.S.	U.S.	F.S.	N.S.	U.S.	F.S.
1	10	12	17	1	11	12
2	9	12	18	2	4	12
3	8	10	10	3	3	9
4	7	10	12	4	4	12
5	7	14	17	5	12	12
6	8	9	12	6	3	11
7	8	14	18	7	7	14
8	8	12	18	8	11	17
9	8	15	17	9	7	12
10	8	12	18	10	7	12
11	7	12	18	11	11	12
12	8	12	18	12	3	12
13	8	11	18	13	9	12
14	8	16	17	14	9	12
15	7	12	17	15	7	12
16	9	11	16	16	6	10
17	8	14	12	17	3	11
18	7	12	11	18	11	9
19	7	12	14	19	4	11
20	7	14	14	20	4	11
21	8	14	12	21	5	11
22	8	12	14	22	3	12
23	9	14	12	23	11	12
24	8	12	12	24	14	12
25	10	11	12	25	9	12
Total	166	212	281	80	165	287
Median	7	12	12	7	7	12
Mean	7.44	12.45	12.94	7.4	7.4	12.02
S.D.	1.77	1.79	2.22	2.02	2.02	2.72

Correlation: Amount Learned With Amount Recalled

N.S. U.S. F.S.
 .52 .30 .21

(b) Relearning. Table VI shows the retention for the three lists as measured by relearning in terms of the time saved. The mean saving scores in seconds running NS 167, UW 177.2 and RW 222, agree with the recall scores in showing poorest scores for NS list, and best scores for the RW. For the time saved in seconds for relearning after the interval of one week there was a mean difference of only 10.2 seconds between the NS and UW in favor of the latter. In contrast with this, there was a difference of 24.2 seconds in favor of the NS after the thirty minute interval (see Table III). The mean number of promptings was six for both the NS and UW while for the RW it was only two. This parallels the results found after thirty minutes (Table III).

(c) Percentage of retention. The mean recall scores after one week in terms of percentages were NS 32.04 per cent, UW 59.56 per cent and RW 85.88 per cent (see Table VII). These results indicate a loss of 35 per cent for the NS beyond that of Group A for the thirty-minute interval, while for the UW the drop is 23 per cent and for the RW it is only 10 per cent. This measure of retention, therefore, indicates poorest retention for the nonsense syllables, and best retention for the related words, with the unrelated words occupying an intermediate position in

(b) Relearning. Table VI shows the retention for the three lists as measured by relearning in terms of the time saved. The mean saving scores in seconds running NS 187, UW 177.2 and RW 222, agree with the recall scores in showing poorest scores for NS list, and best scores for the RW. For the time saved in seconds for relearning after the interval of one week there was a mean difference of only 10.2 seconds between the NS and UW in favor of the latter. In contrast with this, there was a difference of 24.2 seconds in favor of the NS after the thirty minute interval (see Table III). The mean number of promptings was six for both the NS and UW while for the RW it was only two. This parallels the results found after thirty minutes (Table III).

(c) Percentage of retention. The mean recall scores after one week in terms of percentages were NS 32.04 per cent, UW 29.26 per cent and RW 25.88 per cent (see Table VII). These results indicate a loss of 32 per cent for the NS beyond that of Group A for the thirty-minute interval, while for the UW the drop is 23 per cent and for the RW it is only 10 per cent. This measure of retention, therefore, indicates poorest retention for the nonsense syllables, and best retention for the related words, with the unrelated words occupying an intermediate position in

TABLE VI

Experiment II Group B One-Week Interval
Five-Minute Learning Time

Relearning

	Time Saved In Seconds			Number of Promptings		
S.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
1	145	250	195	10	1	4
2	170	70	240	8	9	0
3	245	135	115	5	12	5
4	120	110	180	11	5	2
5	225	240	240	4	1	2
6	145	225	265	8	6	1
7	200	120	195	7	8	3
8	135	240	275	6	4	0
9	50	230	135	12	7	7
10	130	175	240	9	8	1
11	245	230	300	3	2	0
12	165	100	155	7	9	6
13	260	220	265	2	2	0
14	-10	100	210	12	6	2
15	135	155	255	11	6	2
16	205	185	200	6	6	4
17	195	120	250	5	12	2
18	195	200	245	6	4	2
19	240	215	175	4	2	4
20	190	120	225	6	9	3
21	170	140	245	5	7	3
22	165	95	220	5	10	3
23	265	260	285	2	3	0
24	110	260	175	2	1	2
25	80	235	265	7	2	1
Total	4175	4430	5550	163	142	59
Median	170	185	240	6	6	2
Mean	167	177.2	222	6.52	5.68	2.36
S.D.	65.12	60.04	46.52	2.97	3.34	1.85

TABLE VI

Experiment II - Group B - One-Week Interval

Five-Minute Learning Time

Relearning

Time Saved in Seconds		Number of Trials		S.D.		Mean		Median	
S.	U.S.	U.W.	S.	U.S.	U.W.	S.	U.S.	S.	U.S.
1	145	220	10	10	1	2	145	2	145
2	170	70	9	9	0	2	170	2	170
3	245	125	8	8	2	2	245	2	245
4	130	110	11	11	2	2	130	2	130
5	235	240	4	4	1	2	235	2	235
6	145	225	8	8	1	2	145	2	145
7	200	180	7	7	3	2	200	2	200
8	135	240	6	6	4	2	135	2	135
9	20	270	13	13	7	2	20	2	20
10	130	175	3	3	8	1	130	1	130
11	245	230	2	2	0	0	245	0	245
12	165	100	7	7	2	0	165	0	165
13	200	220	6	6	0	0	200	0	200
14	110	100	12	12	2	2	110	2	110
15	135	135	11	11	2	2	135	2	135
16	205	185	6	6	4	2	205	2	205
17	135	130	5	5	3	2	135	2	135
18	165	200	6	6	4	2	165	2	165
19	240	175	4	4	2	4	240	4	240
20	120	225	3	3	3	3	120	3	120
21	170	245	5	5	7	3	170	3	170
22	165	200	5	5	10	3	165	3	165
23	225	220	2	2	0	0	225	0	225
24	110	175	2	2	1	0	110	0	110
25	205	225	7	7	1	0	205	0	205
Total	4175	4430	133	133	142	39	4175	39	4430
Median	170	185	6	6	2	2	170	2	185
Mean	167	177.2	5.58	5.58	2.58	2.58	167	2.58	177.2
S.D.	65.12	60.04	2.97	2.97	1.34	1.34	65.12	1.34	60.04

the retention gradient. The S.D. in per cent recalled was greatest for the UW and smallest for the RW at the week interval.

As measured by time saved in relearning there was a difference of only four per cent between the means of NS and UW in favor of the latter (Table VII), while the mean for RW showed a superiority of 15 per cent over the UW mean. So we find that when retention is measured by relearning the results agree with the recall methods in revealing the relatively superior retention of the RW and in showing poorer retention for NS than for UW. The S.D. here also was smaller for the RW than for either of the other lists. The differences were less for per cents of time saved than for the per cents recalled, being only six per cent between NS and RW and four per cent between UW and RW for relearning while for per cent recalled the difference in S.D.s was ten between RW and NS and thirteen between UW and RW.

Correlation. The degree of correlation between amount learned and amount recalled decreased greatly for both NS and UW after one week as compared with the results obtained after thirty minutes (Table II), while for the RW it decreased comparatively little. For the NS the decrease was .77 to .32, for the UW from .87 to .30, and for the RW it

the retention gradient. The S.D. in per cent recalled was greatest for the UW and smallest for the RW at the week interval.

As measured by time saved in relearning there was a difference of only four per cent between the means of NS and UW in favor of the latter (Table VII), while the mean for RW showed a superiority of 15 per cent over the UW mean. So we find that when retention is measured by relearning the results agree with the recall methods in revealing the relatively superior retention of the RW and in showing poorer retention for NS than for UW. The S.D. here also was smaller for the RW than for either of the other lists. The differences were less for per cents of time saved than for the per cents recalled, being only six per cent between NS and RW and four per cent between UW and RW for relearning while for per cent recalled the difference in S.D.s was ten between RW and NS and thirteen between UW and RW.

Correlation. The degree of correlation between amount

learned and amount recalled decreased greatly for both NS and UW after one week as compared with the results obtained after thirty minutes (Table II), while for the RW it decreased comparatively little. For the NS the decrease was .77 to .38, for the UW from .87 to .30, and for the RW it

TABLE VII

Experiment II		Group B		One-Week Interval		
Five-Minute Learning Time						
Percent Recalled				Percent Time Saved		
S.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
1	20	92	76	48	83	65
2	11	33	94	57	23	80
3	20	37	90	82	45	38
4	15	40	80	40	37	60
5	43	93	94	75	80	80
6	17	67	92	48	75	88
7	12	50	87	67	40	65
8	17	92	94	45	80	92
9	25	54	71	17	77	45
10	17	58	100	43	58	80
11	57	85	100	82	77	100
12	50	17	75	55	33	52
13	83	82	100	87	73	88
14	25	56	88	-3	33	70
15	14	58	88	45	52	85
16	44	54	63	68	62	67
17	37	27	85	65	40	83
18	14	69	82	65	67	82
19	57	85	64	80	72	58
20	29	28	85	63	40	75
21	17	35	85	57	47	82
22	37	23	78	55	32	73
23	78	79	100	88	87	95
24	22	93	89	37	87	58
25	<u>40</u>	<u>82</u>	<u>87</u>	<u>21</u>	<u>78</u>	<u>88</u>
Total	801	1489	2147	1387	1478	1849
Median	25	58	87	55	62	80
Mean	32.04	59.56	85.88	55.48	59.12	73.96
S.D.	19.91	23.65	10.34	21.90	19.77	15.52

TABLE VII

Experiment II Group B One-Week Interval

Five-Minute Learning Time

Percent Recalled

S.	U.S.	U.S.	U.S.	U.S.	U.S.	U.S.
1	60	60	60	60	60	60
2	11	33	64	76	83	83
3	80	37	90	80	80	80
4	15	40	60	60	60	60
5	45	64	76	76	76	76
6	17	67	96	48	76	76
7	18	60	67	67	67	67
8	17	66	64	66	66	66
9	63	64	71	71	71	71
10	17	58	100	45	66	66
11	67	86	100	82	77	100
12	80	17	78	38	38	38
13	83	66	100	67	73	66
14	68	33	68	68	68	68
15	14	68	68	45	68	68
16	44	64	63	68	68	68
17	37	67	63	68	68	68
18	14	66	66	66	66	66
19	67	66	44	60	72	66
20	69	66	66	66	66	66
21	10	66	66	66	66	66
22	37	66	76	66	66	66
23	78	79	100	66	67	66
24	66	66	66	66	66	66
25	40	66	67	61	76	66
Total	601	1466	6147	1387	1478	1848
Median	63	68	67	68	68	68
Mean	38.04	66.66	66.66	66.48	66.18	66.38
S.D.	18.91	66.66	18.64	66.66	18.77	18.66

was from .98 to .81.

EXPERIMENT III

Group A. The raw scores of 62 subjects, who in a group experiment learned lists of 9 NS, 13 UW and 16 RW for a two-and-one-half minute period, are given in Table VIII. The number of items learned from each list are shown together with the recall scores obtained by testing after a thirty-minute interval. The mean number of items learned for the NS list was 6.56, for the UW list 11.55, and for the RW list 15.08. These are slightly lower than the means obtained in Experiments I and II with the same lists but with a different method of learning and more time allowed for learning.

The percentages of the amount learned that were recalled after thirty minutes, as shown in Table IX, were for the three lists NS 74.68, UW 90.87 and RW 95.89. The differences in retention of the three lists found here corresponds fairly closely with the results of the previous experiments.

The S.D.s for the per cent retained for the three lists were NS 23.93, UW 11.87, and RW 5.79. The individual differences both in amount learned and per cent recalled were striking in the results obtained in all the experiments.

was from .98 to .81.

EXPERIMENT III

Group A. The raw scores of 68 subjects, who in a group experiment learned lists of 9 NS, 13 UW and 16 RW for a two-and-one-half minute period, are given in Table VIII. The number of items learned from each list are shown together with the recall scores obtained by testing after a thirty-minute interval. The mean number of items learned for the NS list was 6.56, for the UW list 11.52, and for the RW list 15.08. These are slightly lower than the means obtained in Experiments I and II with the same lists but with a different method of learning and more time allowed for learning.

The percentages of the amount learned that were recalled after thirty minutes, as shown in Table IX, were for the three lists NS 74.68, UW 90.87 and RW 92.82. The differences in retention of the three lists found here corresponds fairly closely with the results of the previous experiments.

The S.D.s for the per cent retained for the three lists were NS 23.33, UW 11.87, and RW 5.79. The individual differences both in amount learned and per cent recalled were striking in the results obtained in all the experiments.

TABLE VIII

Experiment III Group A Thirty-Minute Interval

Two-and-One-half-Minute Learning Time

S.	Amount Learned			Amount Recalled		
	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
1	8	13	16	8	13	16
2	7	12	16	7	12	16
3	9	13	15	9	13	15
4	6	10	15	2	9	13
5	9	10	13	8	10	12
6	9	13	16	9	12	16
7	6	13	16	5	12	16
8	3	11	14	2	9	13
9	9	12	16	9	12	15
10	7	11	15	6	9	14
11	9	13	16	9	13	16
12	8	12	16	7	10	16
13	6	12	14	4	12	13
14	5	8	12	1	4	12
15	3	10	16	1	8	16
16	8	13	16	8	11	15
17	9	13	16	6	12	13
18	9	11	15	6	11	15
19	9	13	16	7	10	16
20	4	11	15	3	10	11
21	6	8	12	3	4	11
22	6	9	16	4	8	15
23	9	12	16	9	11	16
24	6	9	15	5	9	13
25	8	12	16	6	10	16
26	9	12	16	7	12	16
27	6	13	16	4	10	16
28	8	12	14	5	10	11
29	2	10	15	0	10	15
30	7	10	15	6	10	13
31	5	10	15	1	9	15
32	3	8	12	3	8	10
33	7	9	16	7	7	16
34	8	8	16	7	7	15
35	9	13	16	4	13	16

TABLE VIII

Experiment III Group A Thirty-Minute Interval
Two-and-One-half-Minute Learning Time
Amount Learned Amount Recalled

S.	N.S.	U.W.	F.W.	N.S.	U.W.	F.W.
1	8	13	13	8	13	13
2	7	13	13	7	13	13
3	9	13	13	9	13	13
4	6	13	13	6	13	13
5	9	10	13	9	10	13
6	13	13	13	13	13	13
7	6	13	13	6	13	13
8	13	13	13	13	13	13
9	13	13	13	13	13	13
10	7	13	13	7	13	13
11	9	13	13	9	13	13
12	9	13	13	9	13	13
13	6	13	13	6	13	13
14	9	13	13	9	13	13
15	9	13	13	9	13	13
16	9	13	13	9	13	13
17	4	13	13	4	13	13
18	1	13	13	1	13	13
19	1	13	13	1	13	13
20	9	13	13	9	13	13
21	11	13	13	11	13	13
22	13	13	13	13	13	13
23	11	13	13	11	13	13
24	10	13	13	10	13	13
25	10	13	13	10	13	13
26	10	13	13	10	13	13
27	4	13	13	4	13	13
28	9	13	13	9	13	13
29	10	13	13	10	13	13
30	10	13	13	10	13	13
31	10	13	13	10	13	13
32	10	13	13	10	13	13
33	7	13	13	7	13	13
34	8	13	13	8	13	13
35	13	13	13	13	13	13

TABLE VIII - Concluded

Experiment III Group A Thirty-Minute Interval

Two-and-One-half-Minute Learning Time

S.	Amount Learned			Amount Recalled		
	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
36	6	13	16	6	13	15
37	9	13	16	9	13	16
38	6	12	14	4	10	12
39	7	13	16	6	13	16
40	6	12	15	5	10	15
41	5	12	15	3	10	15
42	4	11	15	4	11	15
43	8	9	13	3	8	13
44	8	13	16	7	13	16
45	8	13	16	6	12	16
46	6	10	15	3	9	15
47	6	12	16	4	10	16
48	4	12	15	3	11	15
49	5	12	14	4	12	13
50	6	11	14	5	11	12
51	7	12	12	6	11	12
52	5	12	16	5	12	15
53	9	13	16	9	13	16
54	6	13	15	4	13	15
55	5	13	15	4	13	14
56	4	12	16	1	12	16
57	5	11	14	4	11	12
58	7	12	16	6	7	16
59	6	13	16	3	13	16
60	4	13	14	4	13	13
61	8	13	14	7	13	14
62	5	12	15	3	10	15
Total	407	716	935	316	657	897
Median	6	12	15	5	11	15
Mean	6.56	11.55	15.08	5.10	10.6	14.47
S.D.	1.88	1.51	1.16	2.32	2.10	1.64

Correlation: Amount Learned With Amount Recalled

N.S.	U.W.	R.W.
.83	.84	.84

TABLE VIII - Continued

Experiment III Group A Thirty-Minute Interval
Two-and-One-half-Minute Learning Time

Amount Learned			Amount Recalled		
S.	N.S.	V.P.	N.S.	V.P.	R.W.
26	3	13	3	13	12
27	3	13	3	13	12
28	3	13	4	10	12
29	7	13	3	13	12
30	3	13	3	13	12
31	3	13	3	13	12
32	4	13	4	11	12
33	3	13	3	13	12
34	3	13	7	13	12
35	3	13	3	13	12
36	3	13	3	13	12
37	3	13	3	13	12
38	3	13	3	13	12
39	4	13	3	13	12
40	3	13	3	13	12
41	3	13	3	13	12
42	3	13	3	13	12
43	3	13	3	13	12
44	3	13	3	13	12
45	3	13	3	13	12
46	3	13	3	13	12
47	3	13	3	13	12
48	4	13	3	13	12
49	3	13	3	13	12
50	3	13	3	13	12
51	7	13	3	13	12
52	3	13	3	13	12
53	3	13	3	13	12
54	3	13	3	13	12
55	3	13	4	13	12
56	3	13	4	13	12
57	3	13	4	13	12
58	3	13	3	13	12
59	3	13	3	13	12
60	4	13	3	13	12
61	3	13	7	13	12
62	3	13	3	13	12
Total	437	715	318	637	587
Median	3	13	3	13	12
Mean	3.58	11.55	3.10	10.4	11.47
S.D.	1.88	1.51	2.32	2.13	1.84
Correlation: Amount Learned With Amount Recalled					
	N.S.	V.P.	N.S.	V.P.	
	.33	.84	.33	.84	

TABLE IX

Experiment III Group A Thirty-Minute Interval
 Two-and-One-half-Minute Learning Time
 Per Cent Recalled

S.	N.S.	U.W.	R.W.
1	100	100	100
2	100	100	100
3	100	100	100
4	33	90	87
5	88	100	92
6	100	92	100
7	83	92	100
8	67	82	100
9	100	100	94
10	86	82	93
11	100	100	100
12	88	83	100
13	67	100	93
14	20	50	100
15	33	80	100
16	100	85	94
17	67	100	81
18	67	82	100
19	77	77	100
20	75	91	73
21	50	50	92
22	67	88	94
23	100	92	100
24	83	100	87
25	75	83	100
26	77	100	100
27	67	77	100
28	63	83	79
29	0	100	100
30	86	100	87
31	20	90	100
32	100	100	83
33	100	77	100
34	88	88	94
35	44	100	100

TABLE IX

Experiment III Group A Thirty-Minute Interval
Two-and-One-Half-Minute Learning Time
Per Cent Recalled

S.	W.S.	W.W.	R.W.
1	100	100	100
2	100	100	100
3	100	100	100
4	88	90	87
5	88	100	92
6	100	92	100
7	88	92	100
8	87	89	100
9	100	100	94
10	88	88	73
11	100	100	100
12	88	88	100
13	87	100	98
14	88	80	100
15	88	80	100
16	100	88	94
17	87	100	81
18	87	92	100
19	77	77	100
20	75	91	73
21	80	80	92
22	87	88	84
23	100	92	100
24	83	100	87
25	75	88	100
26	77	100	100
27	87	77	100
28	88	88	72
29	0	100	100
30	88	100	87
31	88	80	100
32	100	100	88
33	100	77	100
34	88	88	84
35	84	100	100

TABLE IX - Concluded

Experiment III Group A Thirty-Minute Interval

Two-and-One-half-Minute Learning Time

Per Cent Recalled

S.	N.S.	U.W.	R.W.
36	100	100	94
37	100	100	100
38	67	83	86
39	86	100	100
40	83	83	100
41	60	83	100
42	100	100	100
43	37	88	100
44	88	100	100
45	75	92	100
46	50	90	100
47	50	77	100
48	75	92	100
49	80	100	93
50	83	100	83
51	86	92	100
52	100	100	94
53	100	100	100
54	67	100	100
55	83	100	93
56	25	100	100
57	80	100	86
58	86	58	100
59	50	100	100
60	100	100	93
61	88	100	100
62	<u>60</u>	<u>83</u>	<u>100</u>
Total	4630	5635	5945
Median	81.5	92	100
Mean	74.68	90.87	95.89
S.D.	23.93	11.87	5.79

Experiment III Group A Thirty-Minute Interval
Two-and-One-half-Minute Learning Time
Per Cent Recalled

S.	N.S.	U.S.	R.W.
36	100	100	94
37	100	100	100
38	67	63	86
39	86	100	100
40	83	83	100
41	60	87	100
42	100	100	100
43	87	86	100
44	88	100	100
45	75	98	100
46	50	90	100
47	50	77	100
48	78	98	100
49	80	100	83
50	88	100	83
51	86	78	100
52	100	100	84
53	100	100	100
54	87	100	100
55	63	100	78
56	88	100	100
57	60	100	88
58	86	88	100
59	80	100	100
60	100	100	83
61	88	100	100
62	60	83	100
Total	4830	8685	8945
Median	61.5	98	100
Mean	74.88	90.67	98.82
S.D.	23.83	11.87	8.77

TABLE X

Experiment III Group B Twenty-Four-Hour Interval
Two-and-One-half-Minute Learning Time

S.	Amount Learned			Amount Recalled		
	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
1	7	13	16	5	13	15
2	8	10	15	3	4	14
3	5	13	13	0	11	11
4	5	13	16	0	8	12
5	6	12	15	0	7	14
6	4	8	12	3	3	12
7	9	13	16	5	8	13
8	8	12	15	4	9	15
9	8	13	16	5	12	16
10	8	11	15	1	7	15
11	6	13	16	3	13	16
12	7	13	16	3	7	13
13	4	9	16	2	8	15
14	7	11	16	2	5	15
15	4	12	14	0	5	12
16	5	13	15	2	6	11
17	9	11	16	4	4	16
18	8	13	15	3	9	14
19	7	13	16	7	9	16
20	7	10	15	3	3	14
21	6	12	16	5	6	15
22	7	12	14	4	9	12
23	5	12	15	1	6	13
24	6	12	13	2	7	10
25	6	12	16	1	6	14
26	6	13	16	4	13	15
27	8	12	16	6	12	16
28	9	13	15	6	13	12
29	7	12	15	4	10	14
30	7	13	16	3	11	12
31	9	13	16	9	13	16
32	5	13	16	2	13	16
33	5	8	14	1	1	11
34	9	13	16	4	13	15
35	6	13	15	3	12	13

TABLE X

Experiment III Group B Twenty-Four-Hour Interval
Two-and-One-Half-Minute Learning Time

Amount Learned		Amount Retained			
S.	N.S.	U.S.	P.S.	N.S.	U.S.
1	7	12	12	2	12
2	6	10	12	3	14
3	5	12	12	4	11
4	5	12	12	5	12
5	4	12	12	6	12
6	4	12	12	7	12
7	3	12	12	8	12
8	3	12	12	9	12
9	3	12	12	10	12
10	3	11	12	11	12
11	2	12	12	12	12
12	7	12	12	13	12
13	4	9	12	14	12
14	7	11	12	15	12
15	4	12	12	16	12
16	5	12	12	17	12
17	2	12	12	18	12
18	3	12	12	19	12
19	2	12	12	20	12
20	4	12	12	21	12
21	5	12	12	22	12
22	7	12	12	23	12
23	2	12	12	24	12
24	2	12	12	25	12
25	3	12	12	26	12
26	3	12	12	27	12
27	3	12	12	28	12
28	2	12	12	29	12
29	7	12	12	30	12
30	7	12	12	31	12
31	2	12	12	32	12
32	3	12	12	33	12
33	2	8	14	34	12
34	2	12	12	35	12
35	2	12	12		

TABLE X - Concluded

Experiment III Group B Twenty-Four-Hour Interval

Two-and-One-half-Minute Learning Time

Amount Learned				Amount Recalled		
S.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
36	8	13	16	6	13	16
37	5	10	14	4	8	13
38	6	11	16	4	7	16
39	6	12	12	3	11	12
40	5	13	15	3	11	14
41	8	7	16	1	4	14
42	6	13	16	0	4	13
43	6	13	15	6	13	15
44	8	9	15	3	0	13
45	6	5	15	2	1	12
46	5	10	15	0	3	11
47	7	10	14	2	3	11
48	5	9	16	1	2	16
49	3	10	16	2	2	13
50	6	11	16	0	10	15
51	7	13	16	0	6	12
52	6	11	16	0	3	15
53	4	13	15	3	10	14
Total	340	612	807	150	407	728
Median	6	12	16	3	7	14
Mean	6.42	11.55	15.23	2.83	7.68	13.74
S.D.	1.46	1.80	.97	2.05	3.85	1.66

Correlation: Amount Learned With Amount Recalled

N.S.	U.W.	R.W.
.52	.79	.61

TABLE X - Continued

Experiment III Group B Twenty-Four-Hour Interval
Two-and-One-Half-Minute Testing Time

Amount Learned		Amount Recalled	
S.	N.S.	U.W.	R.W.
36	6	13	16
37	5	10	14
38	6	11	13
39	5	12	15
40	5	13	15
41	6	7	12
42	5	13	16
43	6	12	15
44	6	9	13
45	6	5	15
46	5	10	15
47	7	10	14
48	5	9	16
49	5	10	15
50	5	11	15
51	7	12	16
52	6	11	15
53	4	12	15
Total	340	612	807
Median	6	12	15
Mean	6.42	11.52	15.28
S.D.	1.42	1.80	1.97

Correlation: Amount Learned With Amount Recalled

N.S.	U.W.	R.W.
.52	.79	.81

TABLE XI

Experiment III Group B Twenty-Four-Hour Interval

Two-and-One-half-Minute Learning Time

Per Cent Recalled

S.	N.S.	U.W.	R.W.
1	72	100	94
2	37	40	93
3	0	85	85
4	0	62	75
5	0	58	93
6	75	37	100
7	55	62	81
8	50	75	100
9	63	92	100
10	12	64	100
11	50	100	100
12	42	54	81
13	50	88	94
14	29	45	94
15	0	42	86
16	40	46	71
17	44	36	100
18	37	69	93
19	100	69	100
20	42	30	93
21	83	50	94
22	57	75	86
23	20	50	87
24	33	58	77
25	17	50	83
26	66	100	94
27	75	100	100
28	67	100	80
29	57	83	93
30	42	85	75
31	100	100	100
32	40	100	100
33	20	12	79
34	44	100	94
35	50	92	87

TABLE XI

Experiment III Group B Twenty-Four-Hour Interval
Two-and-One-half-Minute Learning Time
Per Cent Recalled

S.	U.S.	U.V.	U.W.
1	78	100	94
2	87	40	83
3	0	88	88
4	0	88	78
5	8	88	83
6	78	37	100
7	88	88	81
8	88	78	100
9	88	88	100
10	18	84	100
11	80	100	100
12	48	84	81
13	88	88	84
14	88	48	84
15	0	48	88
16	40	48	71
17	44	88	100
18	87	88	88
19	100	88	100
20	18	88	88
21	88	88	81
22	87	78	88
23	88	88	87
24	88	88	77
25	17	88	88
26	88	100	84
27	78	100	100
28	87	100	88
29	87	88	88
30	48	88	78
31	100	100	100
32	88	100	100
33	88	18	78
34	44	100	84
35	88	88	87

Group B. TABLE XI - Concluded

Experiment III Group B Twenty-Four-Hour Interval was
 not app Two-and-One-half-Minute Learning Time
 called (Table XI) Group B Per Cent Recalled

	S.	N.S.	U.W.	R.W.
36	80	100	100	
37	80	80	93	
38	67	64	100	
39	50	92	100	
40	60	85	93	
41	12	57	83	
42	0	31	81	
43	100	100	100	
44	37	0	87	
45	33	20	80	
46	0	30	73	
47	29	30	79	
48	20	22	100	
49	67	20	81	
50	0	91	94	
51	0	46	75	
52	0	27	94	
53	<u>75</u>	<u>77</u>	<u>93</u>	
Total	2279	3381	4768	
Median	42	64	93	
Mean	43	63.79	89.98	
S.D.	28.16	28.08	8.66	

TABLE II - Continued
 Experiment III Group B Twenty-Four-Hour Interval
 Two-and-One-Half-Minute Learning Time
 Per Cent Recalled

S.	N.S.	V.W.	R.W.
36	80	100	100
37	80	80	93
38	87	84	100
39	70	92	100
40	40	88	83
41	12	87	87
42	0	81	81
43	100	100	100
44	37	0	87
45	38	80	80
46	0	30	73
47	52	30	78
48	83	81	100
49	87	80	81
50	0	80	94
51	0	42	75
52	0	37	84
53	75	77	83
Total	9279	3381	4783
Median	42	84	83
Mean	45	83.78	83.98
S.D.	33.18	33.08	3.88

Group B. The amount learned under similar conditions by 53 subjects who were tested after twenty-four hours was not appreciably different (Table X) but the per cents recalled (Table XI) dropped from NS 74.68, UW 90.87, RW 95.89 obtained after thirty minutes with Group A to NS 43, UW 63.79, RW 89.98 after twenty-four hours with Group B. Thus the drop was nearly equal in per cent for the NS and UW being 31.68 per cent and 27.08 per cent respectively, but it was only about six per cent or one fifth as great for the RW. The S.D. for the percentage retention scores for the UW increased from 11.87 at the thirty-minute interval to 28.08 at the twenty-four hour interval, while the S.D.s of the NS and RW increased only slightly over this period.

EXPERIMENT IV

Group A. The mean learning scores of these 29 subjects, who were given the same materials with two minutes for learning, were slightly lower (Table XII) than those for Groups A and B in Experiment III whose learning time was one-half minute greater (see Tables VIII and X). These mean scores were NS 5.14, UW 11.45, RW 14.59. Comparison of Table XIII with IX reveals that the per cent recalled after thirty minutes was also lower in this experiment than for the two-and-one-half minute group being for NS

Group B. The amount learned under similar conditions by 53 subjects who were tested after twenty-four hours was not appreciably different (Table X) but the per cents recalled (Table XI) dropped from NS 74.68, UW 90.87, RW 92.89 obtained after thirty minutes with Group A to NS 43, UW 68.79, RW 89.98 after twenty-four hours with Group B. Thus the drop was nearly equal in per cent for the NS and UW being 31.68 per cent and 27.08 per cent respectively, but it was only about six per cent or one fifth as great for the RW. The S.D. for the percentage retention scores for the UW increased from 11.87 at the thirty-minute interval to 28.08 at the twenty-four hour interval, while the S.D.s of the NS and RW increased only slightly over this period.

EXPERIMENT IV

Group A. The mean learning scores of these 29 subjects, who were given the same materials with two minutes for learning, were slightly lower (Table XII) than those for Groups A and B in Experiment III whose learning time was one-half minute greater (see Tables VII and X). These mean scores were NS 8.14, UW 11.43, RW 14.59. Comparison of Table XII with IX reveals that the per cent recalled after thirty minutes was also lower in this experiment than for the two-and-one-half minute group being for NS

TABLE XII

Experiment IV			Group A			Thirty-Minute Interval		
Two-Minute Learning Time								
Amount Learned				Amount Recalled				
S.		N.S.	U.W.	R.W.		N.S.	U.W.	R.W.
1		7	12	14		1	11	14
2		5	10	13		2	6	11
3		6	12	15		4	11	15
4		4	12	15		2	10	13
5		8	11	16		7	8	16
6		5	13	15		2	13	14
7		6	13	16		1	12	16
8		2	9	15		2	6	13
9		4	12	15		4	12	14
10		3	12	12		1	10	10
11		6	13	16		3	12	16
12		4	12	16		2	9	16
13		4	11	15		1	10	15
14		7	11	15		6	10	15
15		2	8	12		2	7	12
16		4	12	16		2	10	16
17		3	10	13		5	4	13
18		5	11	13		4	11	12
19		5	13	16		4	13	16
20		8	13	16		6	13	16
21		6	12	15		5	10	15
22		1	9	15		0	8	15
23		9	12	15		7	11	15
24		6	11	14		2	5	13
25		4	10	12		3	9	11
26		6	13	14		6	13	14
27		7	12	15		3	7	13
28		3	10	13		1	6	11
29		<u>9</u>	<u>13</u>	<u>16</u>		<u>9</u>	<u>12</u>	<u>16</u>
Total		149	332	423		97	279	406
Median		5	12	15		3	10	14
Mean		5.14	11.45	14.59		3.34	9.62	14
S.D.		2.03	1.34	1.26		2.21	2.56	1.80

TABLE XII

Experiment IV Group A Thirty-Minute Interval

Two-Minute Learning Time

Amount Learned

S.	U.S.	U.W.	S.	U.S.	U.W.
1	7	12	1	11	14
2	3	10	2	8	11
3	6	12	3	11	12
4	4	12	4	10	12
5	8	11	5	8	12
6	5	12	6	12	14
7	8	12	7	12	12
8	2	9	8	2	12
9	4	12	9	4	12
10	3	12	10	1	10
11	5	12	11	3	12
12	4	12	12	2	12
13	4	12	13	1	10
14	7	11	14	6	10
15	3	8	15	2	12
16	4	12	16	2	12
17	3	10	17	4	12
18	2	11	18	4	12
19	3	12	19	6	12
20	2	12	20	8	10
21	1	9	21	0	12
22	2	12	22	7	12
23	3	12	23	2	12
24	6	11	24	2	12
25	4	10	25	2	11
26	3	12	26	2	12
27	7	12	27	2	12
28	3	10	28	2	12
29	2	12	29	2	12
Total	149	332	Total	272	402
Median	5	12	Median	10	14
Mean	5.14	11.42	Mean	9.38	14.14
S.D.	2.03	1.54	S.D.	2.52	1.50

TABLE XIII

Experiment IV Group A Thirty-Minute Interval

Two-Minute Learning Time

Per Cent Recalled

S. N.S. U.W. R.W.

1	14	92	100
2	40	60	85
3	67	92	100
4	50	83	87
5	88	73	100
6	40	100	93
7	17	92	100
8	100	67	87
9	100	100	93
10	33	83	83
11	50	92	100
12	50	75	100
13	25	91	100
14	86	91	100
15	100	88	100
16	50	83	100
17	60	40	100
18	80	100	92
19	80	100	100
20	75	100	100
21	83	83	100
22	0	88	100
23	77	92	100
24	33	45	93
25	75	90	92
26	100	100	100
27	42	58	87
28	33	60	85
29	<u>100</u>	<u>92</u>	<u>100</u>

Total	1748	2410	2777
Median	60	90	100
Mean	60.28	83.10	95.76
S.D.	28.84	16.46	5.84

TABLE VIII

Experiment IV Group A Thirty-Minute Interval
Two-Minute Learning Time
Per Cent Recalled

S.	W.S.	U.S.	R.S.
1	14	92	100
2	40	80	95
3	87	92	100
4	50	85	97
5	88	75	100
6	40	100	93
7	17	92	100
8	100	87	87
9	100	100	95
10	83	83	83
11	50	92	100
12	60	75	100
13	35	81	100
14	85	81	100
15	100	85	100
16	60	85	100
17	60	40	100
18	80	100	92
19	80	100	100
20	75	100	100
21	83	83	100
22	0	38	100
23	77	92	100
24	83	45	83
25	78	80	92
26	100	100	100
27	43	83	87
28	83	80	85
29	100	92	100
Total	1745	2410	2770
Median	80	90	100
Mean	60.86	87.10	95.76
S.D.	28.84	18.42	8.84

60.28 and for UW 83.10. In the case of RW, however, the per cent recalled here was practically the same as for RW in the previous experiment, the score being 95.76. The RW difference was only .13 while for the NS and UW it was 14 and 8 respectively. The S.D.s of the NS and UW were also greater for this group, but the S.D.s of the RW in these two experiments were about the same and by far the lowest.

Group B. Table XIV shows that for Group B in this experiment the mean scores for learning to be NS 6.46, UW 10.91 and RW 15.18. Thus Group B did slightly better on NS and RW, but not quite so well as Group A on UW in this experimental series. However, the amount recalled was less for all three lists. This group was tested by recall after forty-eight hours and the mean per cents recalled in this test (Table XV) were for NS 42.18, for UW 53.77 and for RW 85.82. Comparing these results with those obtained in the test given after thirty minutes (Table XIII) the greatest loss is found for UW which shows a difference of 29.33 per cent. The drop for NS is 18.1 per cent, but for RW the loss difference is only 9.94 per cent. This shows again the superior retention of the related words. After forty-eight hours the per cent of UW recalled is only 11.59 greater than for the

60.28 and for UW 83.10. In the case of RW, however, the per cent recalled here was practically the same as for RW in the previous experiment, the score being 95.76. The RW difference was only .13 while for the NS and UW it was 14 and 8 respectively. The S.D.s of the NS and UW were also greater for this group, but the S.D.s of the RW in these two experiments were about the same and by far the lowest.

Group B. Table XIV shows that for Group B in this experiment the mean scores for learning to be NS 6.46, UW 10.01 and RW 12.18. Thus Group B did slightly better on NS and RW, but not quite so well as Group A on UW in this experimental series. However, the amount recalled was less for all three lists. This group was tested by recall after forty-eight hours and the mean per cents recalled in this test (Table XV) were for NS 42.18, for UW 53.77 and for RW 55.88. Comparing these results with those obtained in the test given after thirty minutes (Table XIII) the greatest loss is found for UW which shows a difference of 29.33 per cent. The drop for NS is 18.1 per cent, but for RW the loss difference is only 9.94 per cent. This shows again the superior retention of the related words. After forty-eight hours the per cent of UW recalled is only 11.59 greater than for the

TABLE XIV

Experiment IV Group B Forty-eight-Hour Interval

Two-Minute Learning Time

S.	Amount Learned			Amount Recalled		
	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
1	7	10	15	4	8	11
2	8	13	16	4	7	16
3	9	13	16	3	11	13
4	7	13	16	2	7	12
5	6	9	16	2	3	13
6	7	13	16	3	6	13
7	6	12	15	2	5	15
8	5	4	11	0	1	8
9	8	12	16	5	8	12
10	8	11	16	4	5	15
11	7	13	16	5	4	14
12	7	12	16	5	11	16
13	8	7	15	1	3	12
14	4	10	15	1	3	11
15	5	9	13	3	5	10
16	4	10	15	1	4	15
17	5	12	16	4	6	13
18	8	10	15	4	5	14
19	4	10	13	1	4	10
20	4	13	16	2	7	16
21	7	13	15	3	10	13
22	<u>8</u>	<u>11</u>	<u>16</u>	<u>2</u>	<u>10</u>	<u>16</u>
Total	142	240	334	61	133	288
Median	7	11.50	16	3	5.50	13
Mean	6.46	10.91	15.18	2.77	6.05	13.09
S.D.	1.54	2.23	1.29	1.45	2.69	2.18

Correlation: Amount Learned With Amount Recalled

N.S.	U.W.	R.W.
.54	.65	.73

TABLE XIV

Experiment IV Group B Twenty-Minute Interval
Two-Minute Learning Time

Amount Learned						Amount Recalled					
S.	N.S.	N.W.	N.E.	N.S.	N.W.	S.	N.S.	N.W.	N.E.	N.S.	N.W.
1	7	10	15	4	9	11	9	11	15	4	9
2	8	15	15	4	7	12	7	15	15	4	7
3	9	15	15	3	11	13	11	15	15	3	11
4	7	15	15	3	7	13	7	15	15	3	7
5	8	9	15	3	3	13	3	15	15	3	3
6	7	15	15	3	3	13	3	15	15	3	3
7	8	15	15	3	3	13	3	15	15	3	3
8	5	15	15	3	3	13	3	15	15	3	3
9	9	4	11	0	1	8	1	11	15	0	1
10	9	15	15	3	3	13	3	15	15	3	3
11	10	11	15	4	3	13	3	15	15	4	3
12	11	15	15	3	3	14	3	15	15	3	3
13	7	15	15	3	11	15	11	15	15	3	11
14	8	7	15	3	3	15	3	15	15	3	3
15	9	10	15	3	3	15	3	15	15	3	3
16	10	10	15	3	3	15	3	15	15	3	3
17	4	10	15	1	4	15	4	15	15	1	4
18	5	15	15	4	3	15	3	15	15	4	3
19	8	10	15	4	3	15	3	15	15	4	3
20	4	10	15	1	4	15	4	15	15	1	4
21	7	15	15	3	7	15	7	15	15	3	7
22	7	15	15	3	3	15	3	15	15	3	3
23	8	11	15	3	3	15	3	15	15	3	3
Total						Total					
148						138					
240						288					
Mean						Mean					
8.46						8.77					
S.D.						S.D.					
1.54						1.53					

Correlation: Amount Learned With Amount Recalled

N.S.	N.W.	N.E.
.84	.85	.73

TABLE XV

Experiment IV Group B Forty-eight-Hour Interval

Two Minute Learning Time

Per Cent Recalled

S. N.S. U.W. R.W.

1	57	80	73
2	50	54	100
3	33	85	81
4	29	54	75
5	33	33	81
6	42	46	81
7	33	42	100
8	0	25	73
9	63	67	75
10	50	45	94
11	72	31	87
12	72	92	100
13	12	42	80
14	25	30	73
15	60	55	77
16	25	40	100
17	80	50	81
18	50	50	93
19	25	40	77
20	50	54	100
21	42	77	87
22	<u>25</u>	<u>91</u>	<u>100</u>

Total 928 1183 1888

Median 42.00 50.00 81.00

Mean 42.18 53.77 85.82

S.D. 19.91 19.54 10.29

TABLE XV

Experiment IV Group B Forty-eight-Hour Interval
Two Minute Learning Time
For Cent Rats

S.	N.B.	N.B.	N.B.
1	87	80	78
2	80	84	100
3	88	85	81
4	89	84	78
5	83	83	81
6	88	88	81
7	88	88	100
8	0	88	78
9	77	87	78
10	80	85	84
11	78	81	87
12	78	88	100
13	78	88	80
14	88	80	78
15	80	88	77
16	88	80	100
17	80	80	81
18	80	80	88
19	88	80	77
20	88	84	100
21	88	77	87
22	88	81	100
Total	928	1188	1888
Median	88.00	80.00	81.00
Mean	88.18	87.77	88.88
S.D.	18.91	18.84	10.88

NS, but the per cent of RW recalled is 43.64 greater than for NS and 32 greater than for UW. The RW list shows a loss of only 10 per cent over the per cent recalled at the end of the thirty-minute interval. The S.D.s of the UW and the RW were greater in the forty-eight-hour recall than in the thirty-minute test, but the S.D. of the NS here was less than for either of the thirty-minute tests reported in Tables IX and XIII.

Group C. The mean number of items learned by the 58 subjects who were tested after one week was for NS 5.7, for UW 10.86 and for RW 14.91 (Table XVI). These results agree closely with the learning scores of Groups A and B immediately above. However, the data in Table XVII, which shows the per cents recalled one week after learning, reveal a sharp decline from the per cents obtained after the shorter intervals of thirty minutes and forty-eight hours. Here the NS show a mean percentage retention of 30.88, the UW 45.71 and the RW 74.33.

When these scores are compared with those from the thirty-minute interval (Table XIII) it is readily seen that the loss in retention is greatest for the UW (37 per cent) and least for the RW (21 per cent), while the NS suffered a loss of 29 per cent. As would be expected, the contrast with the results of the forty-eight-hour test

NS, but the per cent of RW recalled is 43.64 greater than for NS and 32 greater than for UW. The RW list shows a loss of only 10 per cent over the per cent recalled at the end of the thirty-minute interval. The S.D.s of the UW and the RW were greater in the forty-eight-hour recall than in the thirty-minute test, but the S.D. of the NS here was less than for either of the thirty-minute tests reported in Tables IX and XIII.

Group C. The mean number of items learned by the 38 subjects who were tested after one week was for NS 5.7, for UW 10.68 and for RW 14.91 (Table XVI). These results agree closely with the learning scores of Groups A and B immediately above. However, the data in Table XVII, which shows the per cents recalled one week after learning, reveal a sharp decline from the per cents obtained after the shorter intervals of thirty minutes and forty-eight hours. Here the NS show a mean percentage retention of 30.68, the UW 45.71 and the RW 74.33.

When these scores are compared with those from the thirty-minute interval (Table XIII) it is readily seen that the loss in retention is greatest for the UW (37 per cent) and least for the RW (21 per cent), while the NS suffered a loss of 69 per cent. As would be expected, the contrast with the results of the forty-eight-hour test

TABLE XVI

Experiment IV			Group C	One-Week Interval		
Two-Minute Learning Time						
Amount Learned				Amount Recalled		
S.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
1	2	8	12	1	2	8
2	2	8	13	0	5	9
3	4	11	14	1	10	13
4	6	12	16	1	3	12
5	6	13	15	2	5	11
6	5	12	15	3	11	12
7	6	13	14	2	4	11
8	4	10	13	1	1	5
9	4	12	16	1	9	15
10	9	13	16	4	2	10
11	4	12	15	2	7	14
12	7	12	15	2	5	10
13	4	10	15	1	2	7
14	5	8	13	1	3	7
15	7	7	14	3	4	10
16	5	12	14	0	5	10
17	6	10	15	2	5	13
18	5	12	15	2	3	11
19	6	9	14	0	2	10
20	4	12	14	1	7-	10
21	6	12	16	2	8	14
22	5	13	16	4	8	11
23	7	13	16	1	3	12
24	7	12	15	5	9	10
25	6	8	16	0	3	8
26	5	12	15	0	5	11
27	5	7	13	1	4	10
28	4	9	16	0	1	15
29	4	13	16	1	3	11
30	7	11	16	0	3	14
31	5	10	14	2	6	10
32	9	9	16	3	3	13
33	4	11	16	3	5	14
34	7	11	14	2	5	10
35	8	11	16	2	2	10

TABLE XVI

Experiment IV Group C One-Week Interval

Two-Minute Learning Time

Amount Learned Amount Recalled

S.	N.S.	U.W.	R.W.	S.	U.W.	R.W.
1	8	18	1	8	18	1
2	8	18	1	8	18	1
3	4	17	1	10	10	1
4	6	18	1	8	18	1
5	6	18	1	8	18	1
6	6	18	1	11	11	1
7	6	18	1	8	18	1
8	4	10	1	1	1	1
9	4	18	1	8	18	1
10	9	18	1	8	18	1
11	4	18	1	7	18	1
12	7	18	1	8	18	1
13	4	18	1	8	18	1
14	8	18	1	8	18	1
15	8	18	1	8	18	1
16	8	18	1	8	18	1
17	6	18	1	8	18	1
18	6	18	1	8	18	1
19	6	18	1	8	18	1
20	4	18	1	8	18	1
21	8	18	1	8	18	1
22	8	18	1	8	18	1
23	7	18	1	8	18	1
24	7	18	1	8	18	1
25	8	18	1	8	18	1
26	8	18	1	8	18	1
27	8	18	1	8	18	1
28	4	18	1	8	18	1
29	4	18	1	8	18	1
30	7	18	1	8	18	1
31	8	18	1	8	18	1
32	8	18	1	8	18	1
33	4	18	1	8	18	1
34	7	18	1	8	18	1
35	8	18	1	8	18	1

TABLE XVI - Concluded

Experiment IV	Group C			One-Week Interval		
Two-Minute Learning Time						
Amount Learned				Amount Recalled		
S.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
36	6	12	15	1	8	12
37	8	12	16	0	0	9
38	1	7	13	0	2	6
39	8	10	16	4	8	15
40	5	12	15	3	4	7
41	6	12	16	2	9	15
42	5	10	16	2	6	14
43	7	13	15	1	9	12
44	6	13	15	2	7	13
45	4	9	14	2	6	13
46	7	13	16	1	5	15
47	6	12	15	2	2	10
48	7	11	15	2	7	11
49	6	12	15	3	2	11
50	8	10	16	3	2	16
51	8	12	16	5	11	16
52	2	8	13	1	4	7
53	6	8	16	1	5	14
54	4	10	13	1	5	6
55	9	13	16	3	8	11
56	5	10	15	1	2	11
57	9	13	16	4	13	12
58	<u>7</u>	<u>10</u>	<u>13</u>	<u>4</u>	<u>5</u>	<u>11</u>
Total	330	630	865	103	293	648
Median	6	12	15	2	5	11
Mean	5.70	10.86	14.91	1.78	5.05	11.17
S.D.	1.77	1.82	1.17	1.32	2.86	2.63

Correlation: Amount Learned With Amount Recalled

N.S.	U.W.	R.W.
.53	.37	.63

TABLE XVI - Continued

Experiment IV Group C One-Week Interval

Two-Minute Learning Time

Amount Learned		Amount Recalled	
N.S.	U.W.	N.S.	U.W.
38	12	1	8
37	12	0	0
38	7	0	2
39	10	4	8
40	12	3	4
41	12	2	2
42	12	2	2
43	12	1	2
44	12	2	2
45	9	0	2
46	12	1	2
47	12	2	2
48	11	2	7
49	12	3	2
50	10	3	2
51	12	2	12
52	8	1	2
53	8	1	2
54	10	1	2
55	12	3	2
56	12	1	2
57	12	4	12
58	10	4	2
Total	230	103	248
Median	12	2	2
Mean	10.96	1.78	1.17
S.D.	1.77	1.22	1.22

Correlation: Amount Learned With Amount Recalled

N.S. U.W. S.D.

TABLE XVII

Experiment IV Group C One-Week Interval

Two-Minute Learning Time

Per Cent Recalled

S.	N.S.	U.W.	R.W.
1	50	25	67
2	0	63	69
3	25	91	93
4	17	25	75
5	33	39	73
6	60	92	80
7	33	31	79
8	25	10	39
9	25	75	94
10	44	15	63
11	50	58	93
12	29	42	67
13	25	20	47
14	20	37	54
15	42	29	71
16	0	42	71
17	33	50	87
18	40	25	87
19	0	22	71
20	25	58	71
21	33	67	83
22	80	62	69
23	14	23	75
24	72	75	67
25	0	37	50
26	0	42	73
27	20	57	77
28	0	11	94
29	25	23	69
30	0	27	83
31	40	60	71
32	33	33	81
33	75	45	83
34	29	45	71
35	25	18	63

TABLE XVII

Experiment IV Group C One-Wash Interval
Two-Minute Learning Time
Per Cent Retained

S.	N.S.	U.W.	R.W.
1	50	50	57
2	0	43	52
3	25	51	52
4	17	38	75
5	35	39	73
6	40	32	50
7	33	31	79
8	35	10	39
9	35	75	54
10	44	15	58
11	50	38	52
12	39	48	57
13	38	50	47
14	30	37	54
15	42	39	71
16	0	42	71
17	35	50	57
18	40	32	57
19	0	33	71
20	25	53	71
21	35	57	53
22	50	53	59
23	14	33	75
24	75	75	57
25	0	37	50
26	0	48	73
27	30	37	77
28	0	11	54
29	33	33	59
30	0	37	53
31	40	50	71
32	35	35	31
33	75	45	53
34	39	45	71
35	35	18	52

(Table IV) are not in TABLE XVII - Concluded

Experiment IV Group C One-Week Interval

Two-Minute Learning Time

Per Cent Recalled

S.	N.S.	U.W.	R.W.
36	17	67	80
37	0	0	56
38	0	29	46
39	50	80	94
40	60	33	47
41	33	75	94
42	40	60	83
43	14	69	80
44	33	54	87
45	50	66	93
46	14	39	94
47	33	17	66
48	29	64	73
49	50	17	73
50	37	20	100
51	63	92	100
52	50	50	54
53	17	63	83
54	25	50	46
55	33	62	69
56	20	20	73
57	44	100	75
58	<u>57</u>	<u>50</u>	<u>85</u>
Total	1791	2651	4311
Median	29	43.5	73
Mean	30.88	45.71	74.33
S.D.	19.94	22.93	14.50

TABLE XVII - Continued

Experiment IV Group 3 One-Week Interval

Two-Minute Learning Time

Per Cent Recalled

S.	U.S.	U.W.	R.W.
36	17	24	30
37	0	0	30
38	0	30	42
39	30	30	34
40	30	30	47
41	30	30	34
42	30	30	33
43	14	30	30
44	30	34	37
45	30	30	30
46	14	30	34
47	30	17	36
48	30	34	73
49	30	17	73
50	37	30	100
51	30	30	100
52	30	30	34
53	17	30	30
54	30	30	40
55	30	30	30
56	30	30	73
57	44	100	73
58	37	30	30
Total	1771	1832	4314
Median	30	30.5	73
Mean	30.38	31.71	74.53
S.D.	19.94	30.93	14.50

(Table XV) are not so striking. The week interval percentage retention scores fall below those for the forty-eight-hour interval by 11 per cent for NS, 8 per cent for UW and 12 per cent for RW. The fact that a relatively greater loss in retention was suffered during the first forty-eight hours after learning than during the five subsequent days is in keeping with the findings of Ebbinghaus and many other investigators which have established the now widely known principle that forgetting takes place most rapidly immediately after learning.

The retention of the UW as measured by recall in every experiment in this investigation occupies a point between NS and RW. In all cases the UW are retained better than NS but not so well as the RW. However, the results from Groups A, B and C in Experiment IV reveal an interesting trend. For the thirty-minute interval UW percentage retention was 13 points below RW and 23 points above NS. For the forty-eight-hour interval UW was 32 points below RW and 12 points above NS. For the one-week interval UW was 29 points below RW and 15 points above NS. Thus it appears that the relative superiority for retention of the RW list increases as the length of the interval increases and that the retention of the UW as measured by recall tends as the interval lengthens to move toward the level of the NS.

(Table XV) are not so striking. The week interval percentage retention scores fall below those for the forty-eight-hour interval by 11 per cent for NS, 8 per cent for UW and 18 per cent for RW. The fact that a relatively greater loss in retention was suffered during the first forty-eight hours after learning than during the five subsequent days is in keeping with the findings of Ebbinghaus and many other investigators which have established the now widely known principle that forgetting takes place most rapidly immediately after learning.

The retention of the UW as measured by recall in every experiment in this investigation occupies a point between NS and RW. In all cases the UW are retained better than NS but not so well as the RW. However, the results from Groups A, B and C in Experiment IV reveal an interesting trend. For the thirty-minute interval UW percentage retention was 13 points below RW and 23 points above NS. For the forty-eight-hour interval UW was 32 points below RW and 18 points above NS. For the one-week interval UW was 29 points below RW and 15 points above NS. Thus it appears that the relative superiority for retention of the RW first increases as the length of the interval increases and that the retention of the UW as measured by recall tends as the interval lengthens to move toward the level of the NS.

TABLE XVIII

Experiment V Group A Thirty-Minute Interval

Two Minute Learning Time

S.	Amount Learned			Amount Recalled		
	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
1	6	16	15	5	16	14
2	10	11	16	8	9	15
3	9	15	16	9	15	16
4	4	12	16	3	12	16
5	5	12	14	5	10	14
6	5	11	15	2	11	14
7	8	12	12	5	9	12
8	10	14	16	7	14	15
9	5	16	16	5	15	16
10	4	11	15	4	9	15
11	9	10	15	4	10	14
12	4	16	16	2	15	16
13	5	12	16	5	12	16
14	3	14	16	3	14	16
15	4	7	12	3	7	11
16	3	7	11	0	5	11
17	7	11	13	3	8	12
18	3	14	15	3	13	14
19	4	6	10	3	6	8
20	5	16	15	3	16	14
21	10	14	16	9	12	16
22	3	11	15	3	9	15
23	5	15	16	5	15	16
24	5	16	16	4	16	16
25	4	15	16	4	15	16
26	5	13	15	5	13	15
27	13	16	16	13	16	16
28	4	15	16	3	15	16
29	4	13	14	0	13	14
30	3	7	15	1	7	15
31	5	13	14	4	12	14
32	6	14	16	5	14	16
33	1	16	16	1	16	16
34	7	10	16	4	8	12
35	4	15	16	4	13	16

TABLE XVIII - Concluded

Experiment V Group A Thirty-Minute Interval

Two Minute Learning Time

S.	Amount Learned			Amount Recalled		
	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
36	7	16	16	6	16	16
37	8	12	16	5	12	16
38	4	6	10	2	6	8
39	4	8	16	3	7	16
40	6	12	16	5	10	15
41	5	13	16	5	13	16
42	5	12	11	4	12	11
43	3	11	16	1	11	14
44	4	10	13	4	9	13
45	5	13	14	4	13	12
46	4	13	15	2	11	15
47	10	15	16	9	15	16
48	7	12	12	6	9	12
49	<u>3</u>	<u>16</u>	<u>14</u>	<u>1</u>	<u>15</u>	<u>13</u>
Total	267	615	724	204	579	701
Median	5	13	16	4	13	15
Mean	5.45	12.57	14.78	4.16	11.82	14.31
S.D.	2.39	2.74	1.68	2.45	3.12	2.01

after thirty minutes (Table XIX). The mean per cents recalled after thirty minutes when the equal length lists were learned was NS 74.78, UW 93.87 and RW 97.05, while the figures were NS 60.22, UW 83.13 and RW 92.75 when the unequal lists were used.

The variability as measured by the S.D. was slightly less for NS and UW when the equal length lists were employed. Thus it appears that increasing the length of the NS list from nine to sixteen and the UW list from thirteen

The S.D. of the NS was 19.94 after one week while it was 19.91 after the forty-eight-hour interval. The S.D. of the UW increased from 19.54 at the forty-eight-hour interval to 22.93.

EXPERIMENT V

Group A. It will be recalled that in this phase of the study the three lists were of equal length, 16 syllables, 16 unrelated words, and 16 related words. As shown in Table XVIII the mean number of items learned by Group A is for NS 5.45, for UW 12.57 and for RW 14.78. This is a slight increase in the amount learned and also in the number of items recalled for both NS and UW as compared with the results from the shorter lists shown in Table XII.

There is also an increase for these longer lists of NS and UW over the shorter lists in the per cents recalled after thirty minutes (Table XIX). The mean per cents recalled after thirty minutes when the equal length lists were learned are NS 74.78, UW 93.67 and RW 97.08, while the figures were NS 60.28, UW 83.10 and RW 95.76 when the unequal lists were used.

The variability as measured by the S.D. was slightly less for NS and UW when the equal length lists were employed. Thus it appears that increasing the length of the NS list from nine to sixteen and the UW list from thirteen

The S.D. of the NS was 19.84 after one week while it was 12.91 after the forty-eight-hour interval. The S.D. of the UW increased from 19.84 at the forty-eight-hour interval to 22.93.

EXPERIMENT V

Group A. It will be recalled that in this phase of the study the three lists were of equal length, 16 syllables, 16 unrelated words, and 16 related words. As shown in Table XVII the mean number of items learned by Group A is for NS 8.45, for UW 12.57 and for RW 14.78. This is a slight increase in the amount learned and also in the number of items recalled for both NS and UW as compared with the results from the shorter lists shown in Table XII. There is also an increase for these longer lists of NS and UW over the shorter lists in the per cents recalled after thirty minutes (Table XIX). The mean per cents recalled after thirty minutes when the equal length lists were learned are NS 74.78, UW 93.87 and RW 97.08, while the figures were NS 80.22, UW 83.10 and RW 92.76 when the unequal lists were used.

The variability as measured by the S.D. was slightly less for NS and UW when the equal length lists were employed. Thus it appears that increasing the length of the NS list from nine to sixteen and the UW list from thirteen

TABLE XIX

Experiment V Group A Thirty-Minute Interval
 Two-Minute Learning Time
 Per Cent Recalled

S.	N.S.	U.W.	R.W.
1	83	100	93
2	80	82	94
3	100	100	100
4	75	100	100
5	100	83	100
6	40	100	93
7	63	75	100
8	70	100	94
9	100	94	100
10	100	82	100
11	44	100	93
12	50	94	100
13	100	100	100
14	100	100	100
15	75	100	92
16	0	72	100
17	42	73	92
18	100	93	93
19	75	100	80
20	60	100	93
21	90	86	100
22	100	82	100
23	100	100	100
24	80	100	100
25	100	100	100
26	100	100	100
27	100	100	100
28	75	100	100
29	0	100	100
30	33	100	100
31	80	92	100
32	83	100	100
33	100	100	100
34	57	80	100
35	100	87	100

TABLE XII

Experiment V Group A

Two-Minute Learning Time

Per Cent Recalled

S.	N.S.	U.W.	N.W.
1	83	100	83
2	80	83	84
3	100	100	100
4	78	100	100
5	100	83	100
6	40	100	93
7	63	78	100
8	70	100	84
9	100	84	100
10	100	83	100
11	44	100	83
12	80	84	100
13	100	100	100
14	100	100	100
15	75	100	93
16	0	78	100
17	42	75	83
18	100	83	83
19	75	100	80
20	80	100	83
21	90	84	100
22	100	83	100
23	100	100	100
24	80	100	100
25	100	100	100
26	100	100	100
27	100	100	100
28	78	100	100
29	0	100	100
30	33	100	100
31	80	93	100
32	83	100	100
33	100	100	100
34	83	80	100
35	100	83	100

TABLE XIX - Concluded

Experiment V Group A Thirty-Minute Interval

Two-Minute Learning Time

Per Cent Recalled

S.	N.S.	U.W.	R.W.
36	86	100	100
37	63	100	100
38	50	100	80
39	75	88	100
40	83	83	94
41	100	100	100
42	80	100	100
43	33	100	87
44	100	90	100
45	80	100	86
46	50	85	100
47	90	100	100
48	86	75	100
49	<u>33</u>	<u>94</u>	<u>93</u>
Total	3664	4590	4757
Median	80	100	100
Mean	74.78	93.67	97.08
S.D.	26.15	13.00	5.08

TABLE XIX - Continued

Experiment V Group A Thirty-Minute Interval

Two-Minute Learning Time

Per Cent Recalled

S.	N.S.	N.W.	N.W.
32	82	100	100
37	83	100	100
38	80	100	80
39	78	88	100
40	88	83	84
41	100	100	100
42	80	100	100
43	82	100	87
44	100	80	100
45	80	100	88
46	80	88	100
47	80	100	100
48	88	78	100
49	88	84	88
Total	3284	4890	4737
Median	80	100	100
Mean	74.78	83.87	87.08
S.D.	28.18	18.00	8.08

TABLE XX

Experiment V Group B Forty-eight-Hour Interval

Two-Minute Learning Time

S.	Amount Learned			Amount Recalled		
	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
1	10	11	16	6	4	14
2	8	16	15	3	10	13
3	8	13	16	5	13	16
4	4	14	16	1	10	16
5	14	15	16	6	15	14
6	6	12	12	4	2	8
7	7	15	15	3	1	12
8	11	12	15	8	5	15
9	5	16	15	2	8	12
10	7	16	16	4	11	16
11	2	7	16	0	2	15
12	4	14	16	1	7	13
13	5	10	15	0	5	13
14	7	10	15	2	5	15
15	8	16	16	1	5	16
16	7	15	14	3	2	12
17	5	11	16	4	7	16
18	9	13	14	4	10	10
19	6	15	16	1	14	15
20	10	15	15	5	12	14
21	7	15	16	3	10	16
22	8	16	16	6	15	16
23	4	16	16	2	9	15
24	3	16	14	2	5	12
25	7	16	16	3	13	15
26	6	13	14	1	3	9
27	7	11	16	3	10	15
28	10	16	16	5	10	13
29	9	10	14	3	3	14
30	9	12	16	4	6	15
Total	213	407	459	95	232	415
Median	7	14.50	16	3	7.50	14.50
Mean	7.10	13.57	15.30	3.17	7.73	13.83
S.D.	2.52	2.40	.97	1.91	4.11	2.12

TABLE XX

Experiment V Group B Forty-eight-Hour Interval
Two-Minute Learning Time

Amount Learned		Amount Recalled	
S.	N.S.	U.W.	R.W.
1	10	11	15
2	8	15	15
3	8	15	15
4	4	14	15
5	14	15	15
6	6	15	15
7	7	15	15
8	11	15	15
9	8	15	15
10	7	15	15
11	8	15	15
12	4	14	15
13	5	15	15
14	7	15	15
15	8	15	15
16	7	15	15
17	5	15	15
18	9	15	15
19	4	15	15
20	10	15	15
21	7	15	15
22	8	15	15
23	4	15	15
24	3	15	15
25	7	15	15
26	8	15	15
27	7	15	15
28	10	15	15
29	9	15	15
30	9	15	15
Total	215	407	453
Median	7	14.50	15
Mean	7.16	13.57	15.30
S.D.	2.52	2.40	2.27

to sixteen increased the amount learned, the amount recalled, and the percentage retained for these lists and reduced variability slightly. The time given to learning these longer lists was the same as for the shorter lists.

Group B. Table XX gives the raw learning scores for the equal length lists obtained from the group tested after forty-eight hours. As indicated in that table the mean learning score for NS is 7.10, for UW 13.57 and for RW 15.30. Here also the data on learning and on recall after forty-eight hours show higher mean scores for the NS and UW lists than those recorded for the corresponding shorter length lists in Table XIV.

After forty-eight hours the mean per cents recalled (Table XXI) are for NS 42.27, for UW 55.93 and for RW 90.03. Comparing these results with those from Table XV which gives corresponding results for the unequal length lists, we find that the means for NS are the same and that in this series the mean for UW is two points higher, while the mean for the RW is four points higher.

The S.D. of the UW list was 26.16 compared with 19.54 for the thirteen-word list (Table XV). The S.D.s for the NS and for the RW lists were not significantly different.

Group C. The mean learning scores for Group C were NS 6.18, UW 12.25 and RW 14.67 (Table XXII). Again the

to sixteen increased the amount learned, the amount recalled, and the percentage retained for these lists and reduced variability slightly. The time given to learning these longer lists was the same as for the shorter lists. Group B. Table XX gives the raw learning scores for the equal length lists obtained from the group tested after forty-eight hours. As indicated in that table the mean learning score for NS is 7.10, for UW 12.57 and for RW 15.30. Here also the data on learning and on recall after forty-eight hours show higher mean scores for the NS and UW lists than those recorded for the corresponding shorter length lists in Table XIV.

After forty-eight hours the mean per cents recalled (Table XXI) are for NS 43.87, for UW 55.93 and for RW 59.03. Comparing these results with those from Table IV which gives corresponding results for the unequal length lists, we find that the means for NS are the same and that in this series the mean for UW is two points higher, while the mean for the RW is four points higher.

The S.D. of the UW list was 28.16 compared with 19.54 for the thirteen-word list (Table XV). The S.D.s for the NS and for the RW lists were not significantly different. Group C. The mean learning scores for Group C were NS 6.18, UW 12.23 and RW 14.67 (Table XXII). Again the

TABLE XXI

Experiment V Group B Forty-eight-Hour Interval
 Two-Minute Learning Time
 Per Cent Recalled

S.	N.S.	U.W.	R.W.
1	60	36	87
2	37	63	87
3	63	100	100
4	25	71	100
5	43	100	87
6	67	17	67
7	42	7	80
8	73	42	100
9	40	50	80
10	57	69	100
11	0	29	94
12	25	50	81
13	0	50	87
14	29	50	100
15	12	31	100
16	42	13	86
17	80	64	100
18	44	77	71
19	17	93	94
20	50	80	93
21	42	67	100
22	75	94	100
23	50	56	94
24	67	31	86
25	42	81	94
26	17	23	64
27	42	91	94
28	50	63	81
29	33	30	100
30	<u>44</u>	<u>50</u>	<u>94</u>
Total	1268	1678	2701
Median	42	53	94
Mean	42.27	55.93	90.03
S.D.	20.37	26.16	10.20

TABLE XII

Experiment V - Group B - Forty-eight-hour Interval
Two-minute Learning Time
Per Cent Recalled

S.	W.B.	U.W.	W.B.
1	60	58	87
2	37	55	87
3	87	100	100
4	65	71	100
5	45	100	87
6	87	17	67
7	45	1	80
8	75	45	100
9	45	50	80
10	57	50	100
11	0	50	84
12	35	50	81
13	0	50	87
14	30	80	100
15	45	37	100
16	45	15	86
17	80	44	100
18	44	77	73
19	17	55	84
20	50	50	83
21	45	57	100
22	75	54	100
23	50	55	84
24	87	51	86
25	45	51	84
26	17	55	84
27	45	51	84
28	50	55	81
29	55	50	100
30	44	50	84
Total	1888	1878	2701
Median	45	55	84
Mean	48.37	55.93	80.35
S.D.	20.87	26.15	10.30

TABLE XXII

Experiment V Group C One-Week Interval

Two-Minute Learning Time

S.	Amount Learned			Amount Recalled		
	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
1	7	9	14	1	6	12
2	8	14	16	2	8	13
3	10	9	15	2	8	14
4	6	12	14	2	4	11
5	6	10	13	2	6	12
6	10	13	15	8	7	15
7	4	16	16	1	6	14
8	11	13	16	3	1	13
9	7	14	15	0	10	11
10	4	9	15	1	2	13
11	1	14	15	6	11	12
12	7	9	14	3	1	10
13	8	12	15	3	6	12
14	7	16	16	2	4	10
15	9	15	16	8	12	16
16	8	11	15	6	7	15
17	5	8	12	1	4	12
18	5	13	15	3	11	15
19	5	10	16	0	3	12
20	8	11	12	4	3	11
21	8	16	14	0	5	11
22	7	11	16	1	5	10
23	6	12	16	2	5	15
24	7	16	16	0	9	14
25	10	15	16	5	12	11
26	5	13	15	1	5	6
27	9	16	16	9	16	16
28	13	5	16	6	2	14
29	2	14	16	1	8	13
30	7	11	14	0	6	11
31	9	16	16	3	15	11
32	4	13	15	1	10	15
33	5	11	15	1	5	10
34	6	12	15	1	4	13
35	4	14	16	2	7	13

TABLE XXII

Experiment V Group C One-Week Interval Two-Minute Learning Time

Amount Learned		Amount Recalled	
N.S.	U.W.	N.S.	U.W.
1	9	1	8
2	14	2	8
3	9	3	8
4	12	4	4
5	10	5	6
6	10	6	7
7	4	7	6
8	11	8	1
9	7	9	10
10	4	10	2
11	1	11	11
12	14	12	10
13	9	13	1
14	12	14	4
15	10	15	13
16	11	16	7
17	8	17	1
18	12	18	11
19	10	19	3
20	11	20	3
21	15	21	0
22	11	22	2
23	12	23	1
24	13	24	2
25	10	25	3
26	11	26	12
27	13	27	15
28	14	28	15
29	11	29	1
30	7	30	0
31	9	31	3
32	4	32	1
33	3	33	1
34	6	34	4
35	4	35	7

TABLE XXII - Concluded

Experiment V	Group C			One-Week Interval		
Two-Minute Learning Time						
Amount Learned				Amount Recalled		
S.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
36	7	16	16	2	13	14
37	8	16	16	0	12	14
38	7	13	15	0	2	9
39	10	10	13	2	1	7
40	5	13	14	1	2	12
41	0	11	12	0	4	11
42	7	13	15	1	12	15
43	5	12	15	2	7	13
44	7	12	15	2	7	13
45	5	11	15	1	3	11
46	5	10	10	0	1	6
47	4	14	15	0	13	14
48	8	15	16	3	8	16
49	9	12	14	2	10	8
50	5	9	14	2	5	11
51	2	12	15	0	6	13
52	7	11	16	2	6	15
53	5	10	13	3	5	8
54	9	15	14	2	10	11
55	3	8	15	0	7	13
56	7	12	11	2	4	3
57	7	13	15	4	10	15
58	8	13	13	1	2	11
59	6	11	15	2	6	10
60	8	14	15	3	10	13
61	4	13	15	0	5	10
62	7	8	9	2	2	5
63	<u>7</u>	<u>12</u>	<u>16</u>	<u>3</u>	<u>5</u>	<u>13</u>
Total	410	772	924	133	412	750
Median	7	12	15	2	6	12
Mean	6.18	12.25	14.67	2.11	6.54	11.90
S.D.	3.19	2.44	.76	2.03	3.65	2.72

TABLE XXII - Continued

Experiment V Group C One-Week Interval

Two-Minute Learning Time

Amount Learned		Amount Recalled			
S.	R.S.	U.W.	R.W.	U.S.	R.W.
35	7	15	15	2	15
37	8	15	15	0	15
38	7	15	15	0	15
39	10	15	15	2	1
40	5	15	15	1	2
41	0	15	15	0	4
42	7	15	15	1	15
43	5	15	15	2	7
44	7	15	15	2	7
45	5	15	15	1	8
46	5	15	15	0	1
47	4	15	15	0	13
48	8	15	15	2	8
49	5	15	15	2	10
50	5	15	15	2	8
51	5	15	15	0	5
52	7	15	15	2	15
53	5	15	15	2	5
54	5	15	15	2	10
55	5	15	15	0	7
56	7	15	15	2	4
57	7	15	15	4	10
58	8	15	15	1	5
59	5	15	15	2	5
60	5	15	15	2	10
61	4	15	15	0	5
62	7	5	5	2	5
63	7	15	15	2	5
64	7	15	15	2	15
Total	410	772	784	122	750
Median	7	15	15	2	15
Mean	5.15	12.25	14.67	3.41	11.90
S.D.	3.13	2.44	1.76	2.52	2.72

TABLE XXIII - *Continued*

Experiment V Group C One-Week Interval

Two-Minute Learning Time

Per Cent Recalled

S.	N.S.	U.W.	R.W.
1	14	67	86
2	25	57	81
3	20	88	93
4	33	33	79
5	33	60	92
6	80	54	100
7	25	37	87
8	27	8	81
9	0	71	73
10	25	22	87
11	17	79	80
12	42	11	71
13	37	50	80
14	29	25	63
15	88	80	100
16	75	64	100
17	20	50	100
18	60	85	100
19	0	30	75
20	50	27	92
21	0	31	79
22	14	45	63
23	33	42	94
24	0	56	87
25	50	80	69
26	20	39	40
27	100	100	100
28	46	40	87
29	50	57	81
30	0	55	79
31	33	94	69
32	25	77	100
33	20	45	67
34	17	33	87
35	50	50	81

TABLE XXII

Experiment V Group C One-Week Interval

Two-Minute Learning Time

Per Cent Recalled

S.	N.S.	U.W.	E.W.
1	14	67	68
2	65	57	51
3	60	65	93
4	58	55	78
5	65	63	68
6	60	64	100
7	65	57	67
8	67	5	31
9	0	71	73
10	65	68	67
11	17	73	80
12	43	11	71
13	37	50	80
14	68	65	63
15	68	60	100
16	70	64	100
17	60	50	100
18	60	65	100
19	0	50	75
20	60	57	93
21	0	31	79
22	14	45	63
23	53	48	64
24	0	58	87
25	60	60	69
26	50	33	40
27	100	100	100
28	46	40	87
29	50	57	61
30	0	58	73
31	35	94	68
32	35	77	100
33	60	45	87
34	17	33	67
35	60	60	81

TABLE XXIII - Concluded

Experiment V Group C One-Week Interval

Two-Minute Learning Time

Per Cent Recalled

S. N.S. U.W. R.W.

36	29	81	87
37	0	75	87
38	0	15	60
39	20	10	54
40	20	15	86
41	0	36	92
42	14	92	100
43	40	58	87
44	29	58	87
45	20	27	73
46	0	10	60
47	0	93	93
48	37	53	100
49	22	83	57
50	40	55	79
51	0	50	87
52	29	55	94
53	60	50	62
54	22	67	79
55	0	88	87
56	29	33	27
57	57	77	100
58	12	15	85
59	33	55	67
60	37	71	87
61	0	39	67
62	29	25	55
63	42	42	81

Total 1779 3270 5083

Median 25 50 85
Mean 28.24 51.90 80.68
S.D. 22.43 24.12 16.30

TABLE XXIII - Continued
Experiment V Group C One-Week Interval
Two-Minute Learning Time
Per Cent Recalled

S.	N.S.	T.V.	P.V.
36	39	31	37
37	0	32	37
38	0	13	30
39	30	10	34
40	30	12	32
41	0	32	32
42	14	32	100
43	30	32	37
44	32	32	37
45	30	37	73
46	0	10	30
47	0	32	32
48	37	32	100
49	32	32	37
50	30	32	73
51	0	30	37
52	32	32	34
53	30	30	32
54	32	37	73
55	0	32	37
56	32	32	37
57	37	77	100
58	12	12	32
59	32	32	37
60	37	71	37
61	0	32	37
62	32	32	32
63	32	42	31
Total	1773	3270	3083
Median	32	30	32
Mean	28.24	31.80	30.38
S.D.	22.43	24.12	18.30

NS and UW mean scores for learning are higher for the longer lists than for the corresponding shorter lists of NS and UW recorded in Table XVI.

Table XXIII, which gives the per cents recalled after one week when equal length lists were learned, shows mean retention scores for NS 28.24, for UW 51.90 and for RW 80.68 compared with NS 30.88, UW 45.71 and RW 74.33 for a similar interval when unequal lists were used (Table XVII). Here again the retention of the UW is more nearly that of the NS than it is of the RW, being 24 above NS and 29 below RW. At the thirty-minute interval in this series the UW mean per cent recalled was about three points below RW mean and 19 above the NS mean. The S.D.s here also show greater variability in retention for the NS and UW lists than for the RW list.

CRITICAL RATIOS

Experiment II. Table XXIV contains the critical ratios of the differences in retention for the three kinds of learning material derived from the results obtained in the individual experiment. The ratios were computed for the amount recalled, the time saved in relearning, the number of promptings in relearning, the per cent recalled and per cent time saved in relearning. The formulas used

NS and UW mean scores for learning are higher for the longer lists than for the corresponding shorter lists of NS and UW recorded in Table XVI.

Table XVII, which gives the per cents recalled after one week when equal length lists were learned, shows mean retention scores for NS 88.84, for UW 81.90 and for RW 80.68 compared with NS 80.88, UW 68.71 and RW 74.33 for a similar interval when unequal lists were used (Table XII). Here again the retention of the UW is more nearly that of the NS than it is of the RW, being 84 above NS and 29 below RW. At the thirty-minute interval in this series the UW mean per cent recalled was about three points below NS mean and 19 above the RW mean. The S.D.s here also show greater variability in retention for the NS and UW lists than for the RW list.

CRITICAL RATIOS

Experiment II. Table XXIV contains the critical ratios of the differences in retention for the three kinds of learning material derived from the results obtained in the individual experiment. The ratios were computed for the amount recalled, the time saved in relearning, the number of prompts in relearning, the per cent recalled and per cent time saved in relearning. The formulas used

TABLE XXIV

Critical Ratios (Differences between Means Divided by the Standard Deviation of the Differences between Means) Derived from the results of Experiment II

Five-Minute Learning Time

Amount Recalled

	Group A	Group B
	Thirty-Minute Interval	One-Week Interval
N.S. - U.W.	7.08	6.02
N.S. - R.W.	13.39	18.10
U.W. - R.W.	5.22	5.92

Time Saved in Relearning

	Group A	Group B
	Thirty-Minute Interval	One-Week Interval
N.S. - U.W.	1.39	.56
N.S. - R.W.	2.61	3.44
U.W. - R.W.	3.75	2.95

Number of Promptings in Relearning

	Group A	Group B
	Thirty-Minute Interval	One-Week Interval
N.S. - U.W.	.74	.94
N.S. - R.W.	4.03	5.98
U.W. - R.W.	4.16	4.34

TABLE XXIV

Critical Ratios (Differences between Means Divided by the Standard Deviation of the Differences between Means) Derived from the results of Experiment II

Five-Minute Learning Time

Against Recalled

Group B	Group A	
One-Week Interval	Thirty-Minute Interval	
3.02	7.02	U.S. - U.W.
12.10	12.32	U.S. - R.W.
2.92	7.22	U.W. - R.W.

Time Given in Retention

Group B	Group A	
One-Week Interval	Thirty-Minute Interval	
2.52	1.72	U.S. - U.W.
2.44	2.22	U.S. - R.W.
2.92	2.72	U.W. - R.W.

Number of Promotions in Retention

Group B	Group A	
One-Week Interval	Thirty-Minute Interval	
1.4	1.4	U.S. - U.W.
2.22	4.02	U.S. - R.W.
4.24	4.12	U.W. - R.W.

TABLE XXIV - Concluded

Critical Ratios (Differences between Means¹ Divided by the Standard Deviation of the Differences between Means) Derived from the Results of Experiment II

Per Cent Recalled

	Group A	Group B
	Thirty-Minute Interval	One-Week Interval
N.S. - U.W.	2.93	4.45
N.S. - R.W.	6.00	11.99
U.W. - R.W.	5.69	5.10

Per Cent Time Saved in Relearning

	Group A	Group B
	Thirty-Minute Interval	One-Week Interval
N.S. - U.W.	1.40	.62
N.S. - R.W.	2.40	3.42
U.W. - R.W.	3.52	2.96

¹The correlations between the means on which the critical ratios were based were not significant, ranging from .0 to .50. Thus it was considered unnecessary to add the correction required when there is a high correlation between the variables.

TABLE XXIV - Continued

Critical Ratios (Differences between Means) Adjusted by the Standard Deviation of the Differences between Means) Derived from the Results of Experiment II

For Count Recalled

Group B	Group A	
One-Week Interval	Thirty-Minute Interval	
4.45	2.25	U.S. - U.W.
11.95	2.00	U.S. - P.W.
2.10	2.25	U.W. - P.W.

For Count Time Saved in Repeating

Group B	Group A	
One-Week Interval	Thirty-Minute Interval	
2.25	1.20	U.S. - U.W.
2.45	2.40	U.S. - P.W.
2.25	2.25	U.W. - P.W.

The correlations between the means on which the critical ratios were based were not significant, ranging from 0 to .50. Thus it was considered unnecessary to add the correction required when there is a high correlation between the variables.

are written¹

$$\text{S.D.}_m = \frac{\text{S.D. dis.}}{\sqrt{N}} \quad \text{and} \quad \sigma \text{ diff.} = \sqrt{\sigma_{m_1}^2 + \sigma_{m_2}^2}$$

All of the critical ratios indicate a high degree of reliability except: (1) time saved in relearning at both the thirty-minute and one-week interval for NS and UW, (2) number of promptings in relearning at the same intervals for NS and UW, and (3) per cent of time saved for the intervals mentioned above for NS and UW. A critical ratio of 3.00 indicates that the chances are 99.9 times out of 100 the obtained differences would be greater than zero.

Experiment III. The differences in the means for amounts and per cents recalled from the three lists were all reliable as indicated by the critical ratios found in Table XXV.

Experiment IV. The high critical ratios obtained for the differences in amount recalled for all three lists by Groups A, B and C found in Table XXVI indicate that there is little possibility of there not being a true difference even between the UW and RW lists in amount recalled. This is also true for the per cent recalled except in the case of Group B in the difference between NS and UW.

¹J. P. Guilford, op. cit. page 137.

are written¹

$$S.D. = \frac{S.D. \text{ diff.}}{\sqrt{N}} \quad \text{and} \quad r \text{ diff.} = \frac{\sqrt{N} \cdot S.D. \text{ diff.}}{S.D. \text{ diff.} + \frac{1}{2}}$$

All of the critical ratios indicate a high degree of reliability except: (1) time saved in relearning at both the thirty-minute and one-week interval for NS and UW, (2) number of promptings in relearning at the same intervals for NS and UW, and (3) per cent of time saved for the intervals mentioned above for NS and UW. A critical ratio of 3.00 indicates that the chances are 99.4 times out of 100 the obtained differences would be greater than zero.

Experiment III. The differences in the means for amounts and per cents recalled from the three lists were all reliable as indicated by the critical ratios found in Table XXV.

Experiment IV. The high critical ratios obtained for the differences in amount recalled for all three lists by Groups A, B and C found in Table XXVI indicate that there is little possibility of there not being a true difference even between the UW and HW lists in amount recalled. This is also true for the per cent recalled except in the case of Group B in the difference between NS and UW.

¹J. P. Guilford, op. cit. page 137.

TABLE XXV

Critical Ratios(Differences between Means Divided by the Standard Deviation of the Differences between Means) Derived from the Results of Experiment III

Two-and-one-half-Minute Learning Time

Amount Recalled

	Group A	Group B
	Thirty-Minute Interval	Twenty-four-Hour Interval
N.S. - U.W.	13.75	8.08
N.S. - R.W.	26.03	30.31
U.W. - R.W.	11.38	10.45

Per Cent Recalled

	Group A	Group B
	Thirty-Minute Interval	Twenty-four-Hour Interval
N.S. - U.W.	4.78	3.82
N.S. - R.W.	6.78	11.60
U.W. - R.W.	2.99	6.48

TABLE XXV

Critical Ratios (Differences between Means Divided by the Standard Deviation of the Differences between Means) Derived from the Results of Experiment III

Two-and-one-half-Minute Learning Time

<u>Amount Recalled</u>		
Group A	Group B	
Thirty-Minute Interval	Twenty-Four-Hour Interval	
U.S. - U.W.	8.08	
U.S. - R.W.	30.31	
U.W. - R.W.	10.45	

<u>Per Cent Recalled</u>		
Group A	Group B	
Thirty-Minute Interval	Twenty-Four-Hour Interval	
U.S. - U.W.	8.68	
U.S. - R.W.	11.30	
U.W. - R.W.	8.68	

TABLE XXVI

Critical Ratios (Differences between Means Divided by the Standard Deviation of the Differences between Means) Derived from the Results of Experiment IV

Two-Minute Learning Time			
<u>Amount Recalled</u>			
	Group A	Group B	Group C
	Thirty-Minute Interval	Forty-eight-Hour Interval	One-Week Interval
N.S. - U.W.	9.97	5.05	7.80
N.S. - R.W.	20.11	18.76	24.08
U.W. - R.W.	7.55	9.64	11.77

<u>Per Cent Recalled</u>			
	Group A	Group B	Group C
	Thirty-Minute Interval	Forty-eight-Hour Interval	One-Week Interval
N.S. - U.W.	3.71	1.95	3.71
N.S. - R.W.	6.49	9.09	13.41
U.W. - R.W.	3.91	6.82	8.02

TABLE XXVI

Critical Ratios (Differences between Means Divided by the Standard Deviation of the Differences between Means) Derived from the Results of Experiment IV

Two-Minute Resting Time

Amount Recalled

Group A	Group B	Group C
Thirty-Minute Interval	Forty-eight-Hour Interval	One-Week Interval
N.S. - U.W.	5.05	7.80
N.S. - R.W.	18.78	24.08
U.W. - R.W.	7.85	11.77

Per Cent Recalled

Group A	Group B	Group C
Thirty-Minute Interval	Forty-eight-Hour Interval	One-Week Interval
N.S. - U.W.	1.85	3.71
N.S. - R.W.	8.49	13.41
U.W. - R.W.	3.91	8.02

Experiment V. Increasing the length of the NS list and UW list did not significantly affect the critical ratios of the amounts learned (Table XXVII) but in the per cent recalled at the thirty-minute interval, the difference between the UW and RW was not reliable and the critical ratio between the NS and UW in per cent recalled at the forty-eight-hour interval was only 2.26.

Comparison of Tables XXVI and XXVII suggests that varying the length of the lists under the conditions of these experiments did not significantly affect the reliability of the differences found in the amounts learned from the three lists and in the per cents recalled from them except at the thirty-minute interval for the difference between the recall scores for UW and RW. Perhaps this exception is due to the fact that increasing the length of the unrelated list increased its per cent recalled, thus reducing the difference between the recall percentages of UW and RW at this interval.

SUMMARY OF RESULTS

Experiment II. Table XXVIII shows the trend which appears consistently throughout this investigation; namely, the UW list has a retention value intermediate between the NS and RW. At the thirty-minute interval the percentages, measured by recall, are NS 67, UW 82, RW 96; at the one

Experiment V. Increasing the length of the NS list

and UW list did not significantly affect the critical ratios of the amounts learned (Table XXVII) but in the per cent recalled at the thirty-minute interval, the difference between the UW and RW was not reliable and the critical ratio between the NS and UW in per cent recalled at the forty-eight-hour interval was only 2.85.

Comparison of Tables XXVI and XXVII suggests that varying the length of the lists under the conditions of these experiments did not significantly affect the reliability of the differences found in the amounts learned from the three lists and in the per cents recalled from them except at the thirty-minute interval for the difference between the recall scores for UW and RW. Perhaps this exception is due to the fact that increasing the length of the unrelated list increased its per cent recalled, thus reducing the difference between the recall percentages of UW and RW at this interval.

SUMMARY OF RESULTS

Experiment II. Table XXVIII shows the trend which

appears consistently throughout this investigation; namely, the UW list has a retention value intermediate between the NS and RW. At the thirty-minute interval the percentages measured by recall, are NS 57, UW 52, RW 56; at the one

TABLE XXVII

Critical Ratios(Differences between Means Divided by the Standard Deviation of the Differences between Means) Derived from the Results of Experiment V

Two-Minute Learning Time

Amount Recalled

	Group A	Group B	Group C
	Thirty-Minute Interval	Forty-eight-Hour Interval	One-Week Interval
N.S. - U.W.	13.44	5.49	8.36
N.S. - R.W.	22.56	20.50	22.77
U.W. - R.W.	4.61	7.19	9.40

Per Cent Recalled

	Group A	Group B	Group C
	Thirty-Minute Interval	Forty-eight-Hour Interval	One-Week Interval
N.S. - U.W.	4.53	2.26	5.70
N.S. - R.W.	5.87	11.48	15.03
U.W. - R.W.	1.70	6.66	7.84

TABLE XVII

Critical Ratios (Differences between Means Divided by the Standard Deviation of the Differences between Means) Derived from the Results of Experiment V

Two-Minute Learning Time

Amount Recalled

Group A	Group B	Group C
Thirty-Minute Interval	Forty-eight-Hour Interval	One-Week Interval
U.W. - R.W. 4.83	7.19	9.40
R.S. - R.W. 22.26	20.80	22.77
U.S. - U.W. 13.44	5.42	8.36

Per Cent Recalled

Group A	Group B	Group C
Thirty-Minute Interval	Forty-eight-Hour Interval	One-Week Interval
U.W. - R.W. 1.70	6.66	7.84
R.S. - R.W. 8.97	11.48	12.08
U.S. - U.W. 4.55	8.26	5.70

TABLE XXVIII

Summary: Results of Experiment II

Five-Minute Learning Time

Per Cent Recalled

	Group A		Group B	
	Thirty-Minute Interval		One-Week Interval	
	Recall	Relearning	Recall	Relearning
N.S.	67.04	78.20	32.04	55.48
U.W.	82.44	69.52	59.56	59.12
R.W.	96.32	89.76	85.88	73.96

TABLE XXIX

Summary: Results of Experiment III

Two-and-one-half-Minute Learning Time

Per Cent Recalled

	Group A	Group B
	Thirty-Minute Interval	Twenty-four-Hour Interval
N.S.	74.68	43
U.W.	90.87	63.79
R.W.	95.89	89.98

TABLE XVIII

Summary: Results of Experiment II

Five-minute testing time

For Data Recalled

Group A			Group B		
Thirty-minute Interval			Ten-minute Interval		
Recall	Retaining		Recall	Retaining	
U.S.	47.04	75.70	52.04	72.48	
U.W.	52.44	69.32	52.02	52.12	
R.W.	52.32	67.78	52.56	52.22	

TABLE XIX

Summary: Results of Experiment III

Two-and-one-half-minute testing time

For Data Recalled

Group A			Group B		
Thirty-minute Interval			Twenty-four-hour Interval		
Recall	Retaining		Recall	Retaining	
U.S.	74.62	42			
U.W.	50.87	62.72			
R.W.	52.82	62.22			

week interval NS 32, UW 60 and RW 86. When saving scores in relearning are used as the measure the NS is superior to the UW at the thirty-minute interval, the mean scores being NS 78, UW 69 with the RW at 90 per cent. At the one-week interval the NS retention score fell below the UW score in terms of time saved, the mean scores then being NS 55, UW 59 and RW 74 per cent. These data are graphically presented in Figures 3 and 4. Here it is clearly demonstrated that the RW lists maintains consistently its relatively high retention value while the NS and UW fall sharply during the interval of one week.

Experiment III. Incomplete learning produced results slightly different from the complete mastery level of the individual Experiment II. The UW (Table XXIX) was recalled after thirty minutes at the 91 per cent level but dropped to 64 per cent at the end of twenty-four hours. At the longer interval the UW had fallen 27 per cent and the NS had declined 32 per cent, but the RW showed a drop of only 6 per cent from the thirty-minute measure. This resulted in the UW being relatively closer (in per cent recalled) to the NS and farther from the RW at the twenty-four-hour period than at the thirty-minute period. Figure 5 was constructed from these data. It shows the superior retention of RW for the longer interval.

week interval NS 32, UW 60 and RW 66. When saving scores in relearning are used as the measure the NS is superior to the UW at the thirty-minute interval, the mean scores being NS 78, UW 69 with the RW at 90 per cent. At the one-week interval the NS retention score fell below the UW score in terms of time saved, the mean scores then being NS 55, UW 59 and RW 74 per cent. These data are graphically presented in Figures 3 and 4. Here it is clearly demonstrated that the RW lists maintains consistently its relatively high retention value while the NS and UW fall sharply during the interval of one week.

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Per Cent

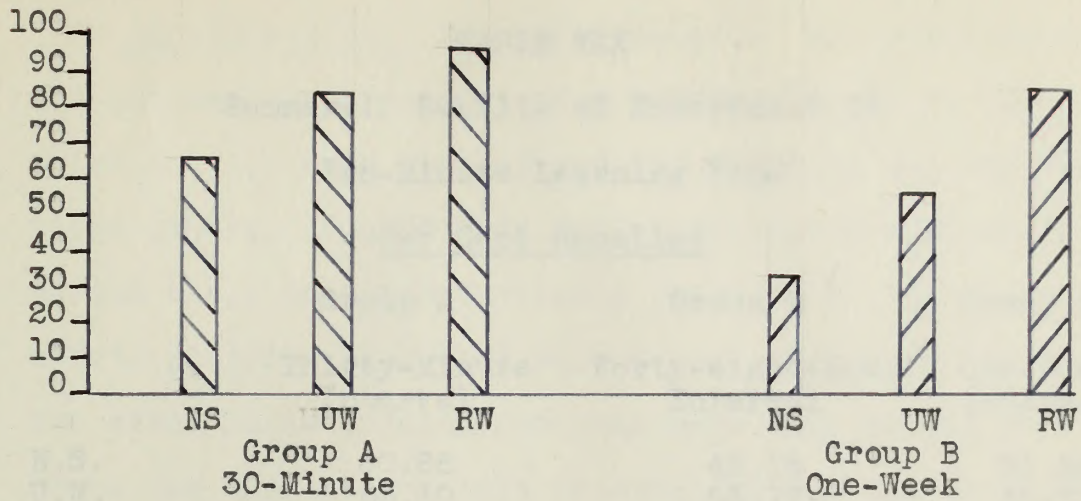


Fig. 3. Per Cent Retained as Measured by Recall (Experiment II)

Per Cent

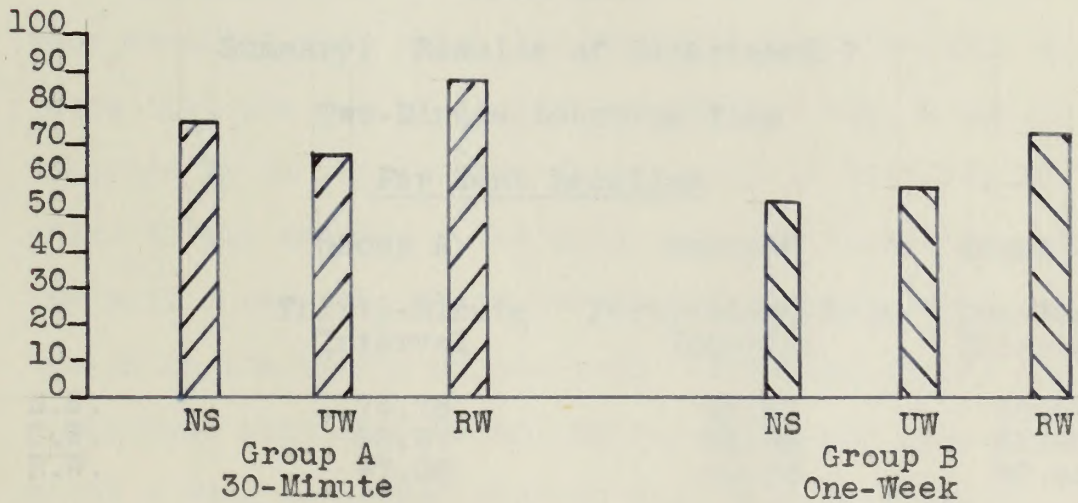


Fig. 4. Per Cent Retained as Measured by Time Saved in Relearning (Experiment II)

Per Cent

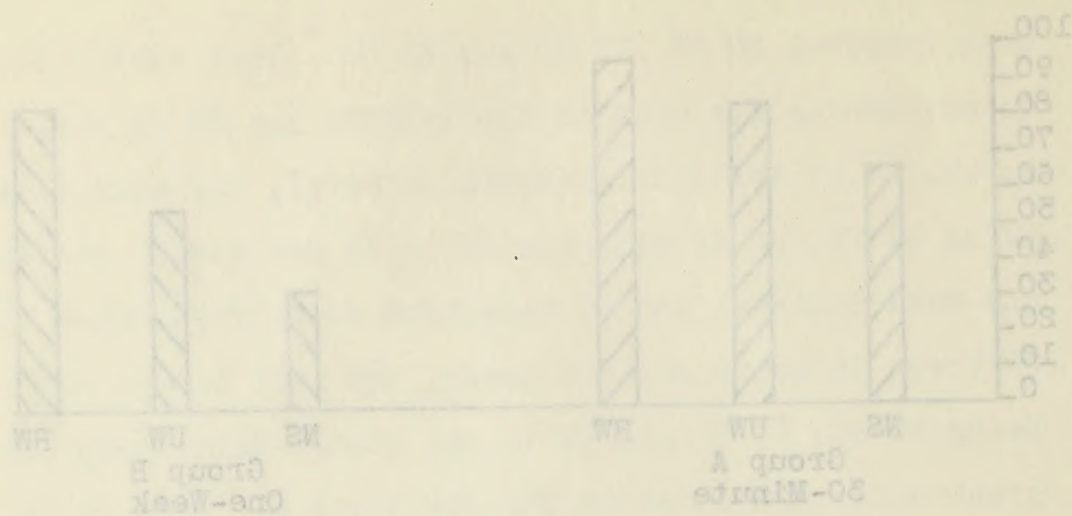


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Per Cent

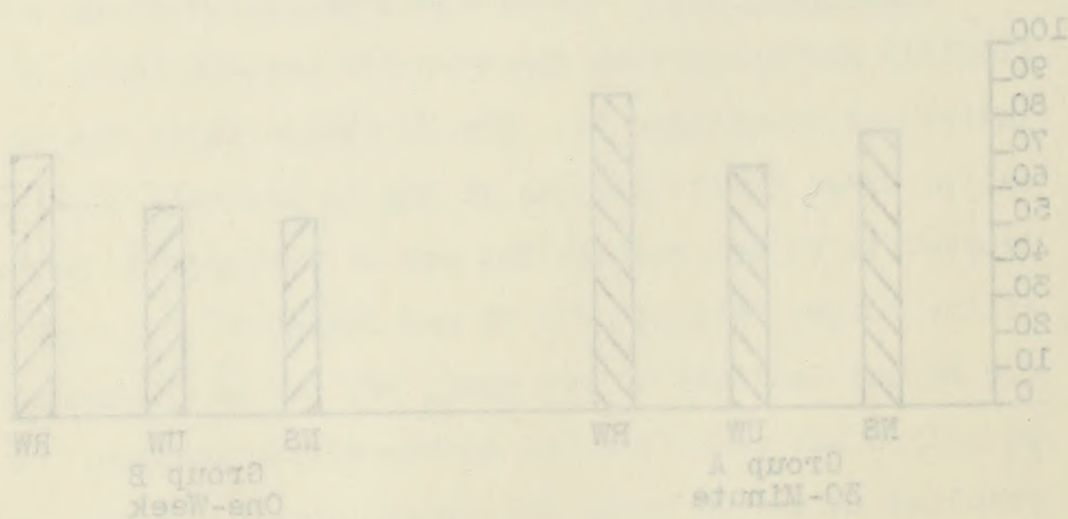


Fig. 4. Per Cent Retained as Measured by Time Saved in Relearning (Experiment II)

Experiment IV. TABLE XXX

Summary: Results of Experiment IV

Two-Minute Learning Time

Per Cent Recalled

	Group A	Group B	Group C
	Thirty-Minute Interval	Forty-eight-Hour Interval	One-Week Interval
N.S.	60.28	42.18	30.88
U.W.	83.10	53.77	45.71
R.W.	95.76	85.82	74.33

Experiment V. TABLE XXXI

Summary: Results of Experiment V

Two-Minute Learning Time

Per Cent Recalled

	Group A	Group B	Group C
	Thirty-Minute Interval	Forty-eight-Hour Interval	One-Week Interval
N.S.	74.78	42.27	28.24
U.W.	93.67	55.93	51.90
R.W.	97.08	90.03	80.68

These data have established the following facts:

1. After thirty minutes U.W. have in retention by N.S. and R.W. relatively higher retention values than at a twenty-four hour, forty-eight hour or one-week interval.

TABLE XXX

Summary: Results of Experiment IV

Two-Minute Learning Time

Per Cent Recalled

Group A	Group B	Group C
Thirty-Minute Interval	Forty-eight-Hour Interval	One-Week Interval
88.75	46.18	30.85
83.10	53.77	43.71
93.75	55.55	44.55

TABLE XXXI

Summary: Results of Experiment V

Two-Minute Learning Time

Per Cent Recalled

Group A	Group B	Group C
Thirty-Minute Interval	Forty-eight-Hour Interval	One-Week Interval
74.75	43.27	47.54
83.67	53.25	51.90
97.08	50.00	50.58

Experiment IV. The thirty-minute, forty-eight-hour and one-week intervals yielded results (Shown in Table XXX) which fit the same general pattern found in the two previous tables. The UW had lost at the forty-eight-hour period their relative favorable position at the thirty-minute period. Then they were 23 per cent above the NS, but after forty-eight hours they were only 12 per cent above the NS. At the last interval tested the UW were 15 per cent above the NS and 28 per cent below the RW. Figure 6 gives the relative retention value in per cent recalled for all three lists at the three intervals measured.

Experiment V. Table XXXI, which indicates the per cent recalled when equal length lists were learned, suggests that the use of longer lengths for the NS and UW resulted in an improvement in per cent of UW recalled after thirty minutes. The mean per cent recall for UW was only 3 per cent below the RW and 19 per cent above the NS in the thirty-minute test. However, at the forty-eight-hour point the UW had fallen to 56 per cent and after a week to 52 per cent so that they were again nearer (in retention value) NS than RW, (Figure 7).

These data have established the following facts:

1. After thirty minutes UW have in relation to NS and RW, relatively, higher retention value than at a twenty-four hour, forty-eight hour or one-week interval.

Experiment IV. The thirty-minute, forty-eight-hour and one-week intervals yielded results (shown in Table XXX) which fit the same general pattern found in the previous tables. The UW had lost at the forty-eight-hour period their relative favorable position at the thirty-minute period. Then they were 83 per cent above the NS, but after forty-eight hours they were only 12 per cent above the NS. At the last interval tested the UW were 12 per cent above the NS and 28 per cent below the RW. Figure 6 gives the relative retention value in per cent recalled for all three lists at the three intervals measured.

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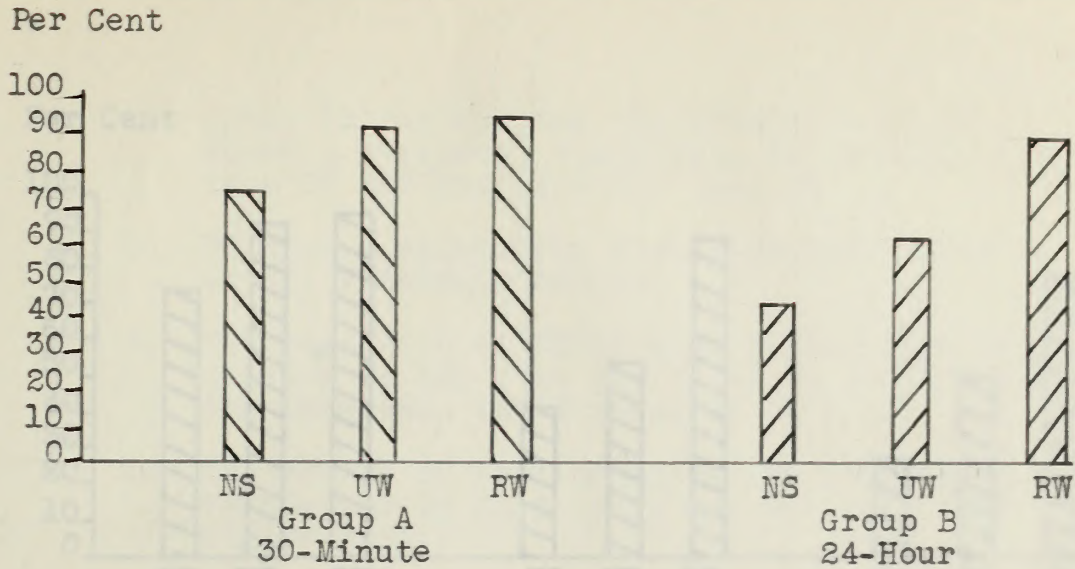


Fig. 5. Per Cent Retained as Measured by Recall
(Experiment III)

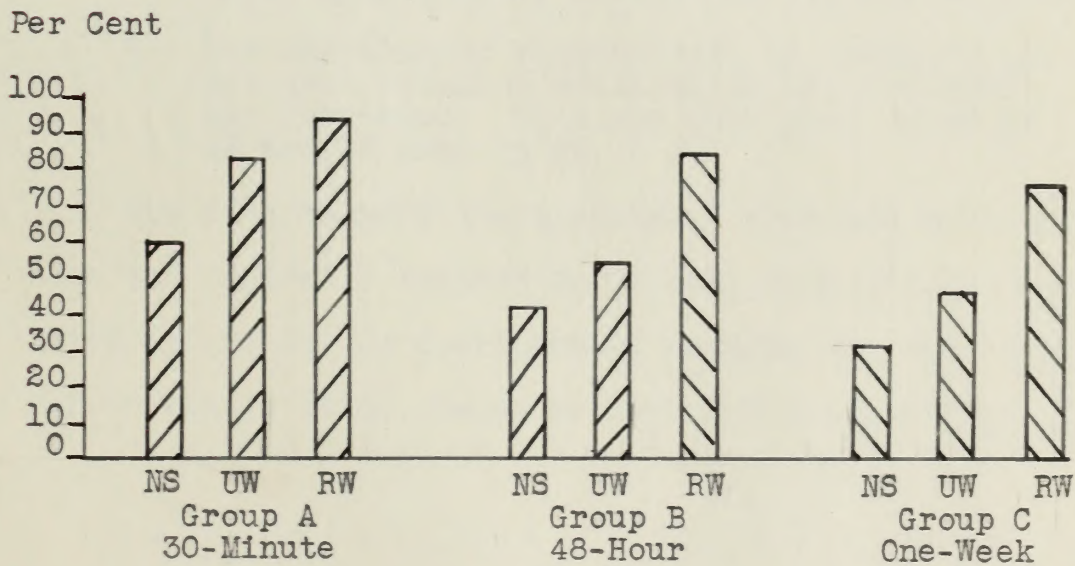


Fig. 6. Per Cent Retained as Measured by Recall
(Experiment IV)

Per Cent

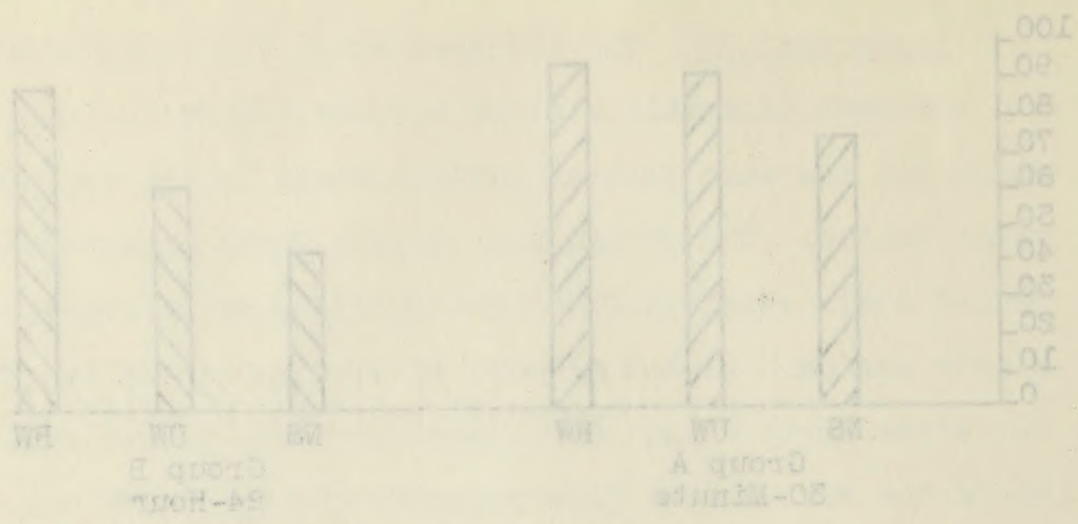


Fig. 5. Per Cent Retained as Measured by Recall (Experiment III)

Per Cent

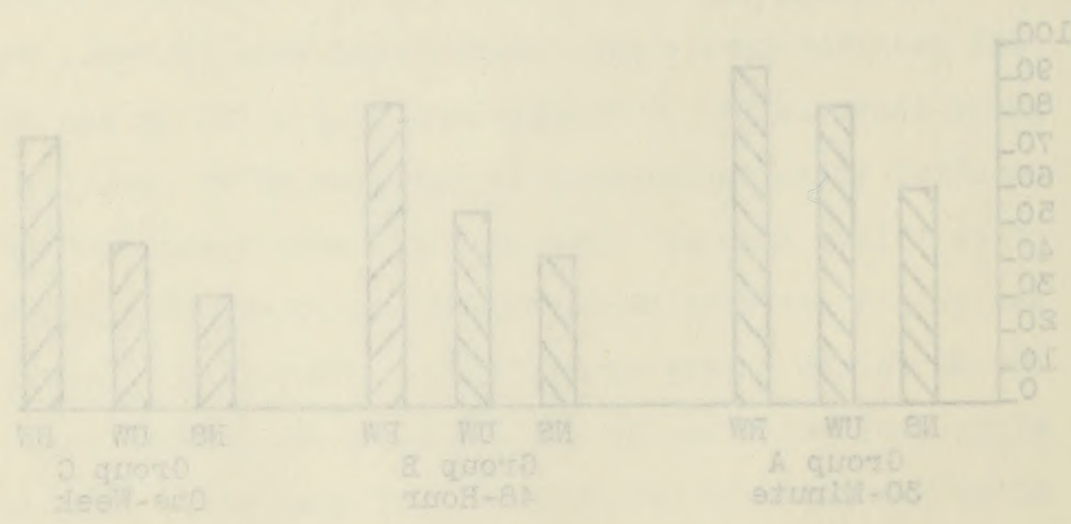


Fig. 6. Per Cent Retained as Measured by Recall (Experiment IV)

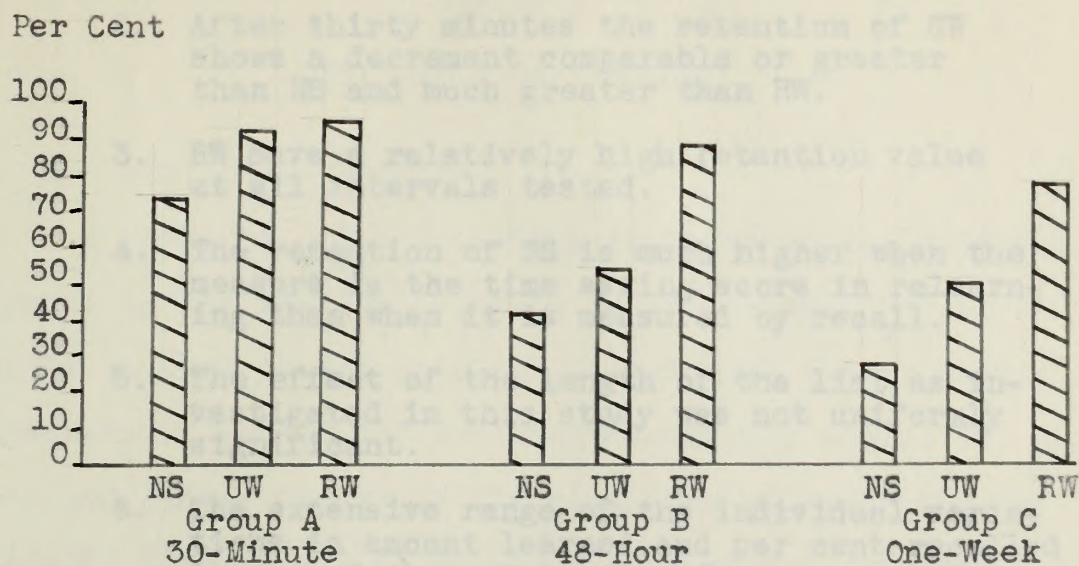


Fig. 7. Per Cent Retained as Measured by Recall
(Experiment V)

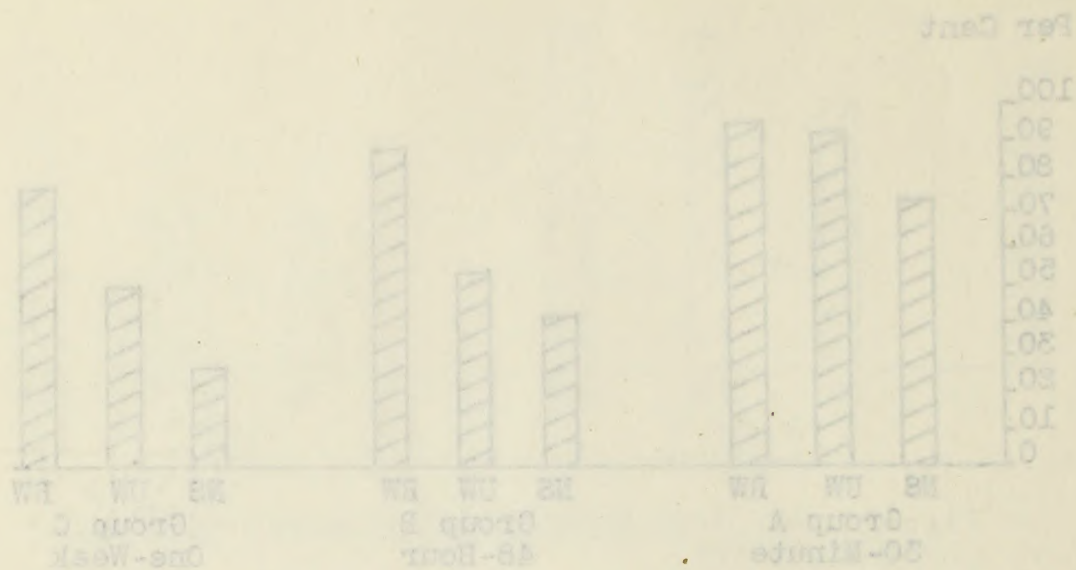


Fig. 7. Percent Retained as Measured by Recall (Experiment V)

2. After thirty minutes the retention of UW shows a decrement comparable or greater than NS and much greater than RW.
3. RW have a relatively high retention value at all intervals tested.
4. The retention of NS is much higher when the measure is the time saving score in relearning than when it is measured by recall.
5. The effect of the length of the list as investigated in this study was not uniformly significant.
6. The extensive range of the individual variations in amount learned and per cent recalled is one of the outstanding facts revealed.
7. The learning method and the measure of retention significantly affect the results obtained.
8. The correlation between rate of learning and per cent recalled declined as the interval was increased. This was much more rapid in NS and UW than in RW.

The data support the hypothesis that nonsense syllables and topically related words represent widely separated points on the continuum of meaning where meaningful unrelated words occupy an intermediate position.

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 7. The learning method and the measure of retention significantly affect the results obtained.
 8. The correlation between rate of learning and per cent recalled declined as the interval was increased. This was much more rapid in MS and UW than in RW.
- The data support the hypothesis that nonsense syllables and topically related words represent widely separated points on the continuum of meaning where meaning-unrelated words occupy an intermediate position.

CHAPTER V
DISCUSSION OF RESULTS

I THE NATURE OF RETENTION

A gradient. The following facts are clearly established by the results obtained in this study: (a) topically related verbal material is retained better than nonsense syllables or unrelated meaningful words, (b) for the longer intervals the retention value of the unrelated words tends to approach that of the nonsense syllables and finally (c) the topically related words tend to maintain their high retention value. Figure 8, a graphic representation of the per cent recalled after thirty minutes, forty-eight hours and one week for all three materials in Experiment IV, portrays these three points.

The difference in retention value of the UW list and RW list was 13 per cent after thirty minutes but after forty-eight hours the difference increased to 32 per cent and after one week the difference was 28 per cent. The NS list declined 18 per cent from the thirty minutes to the forty-eight-hour interval so that while it was 23 per cent below the UW list after thirty minutes it was only 12 per cent below the UW list at the forty-eight-hour interval. At the end of one week the NS list was 15 per cent below the UW list in retention value. The drop in

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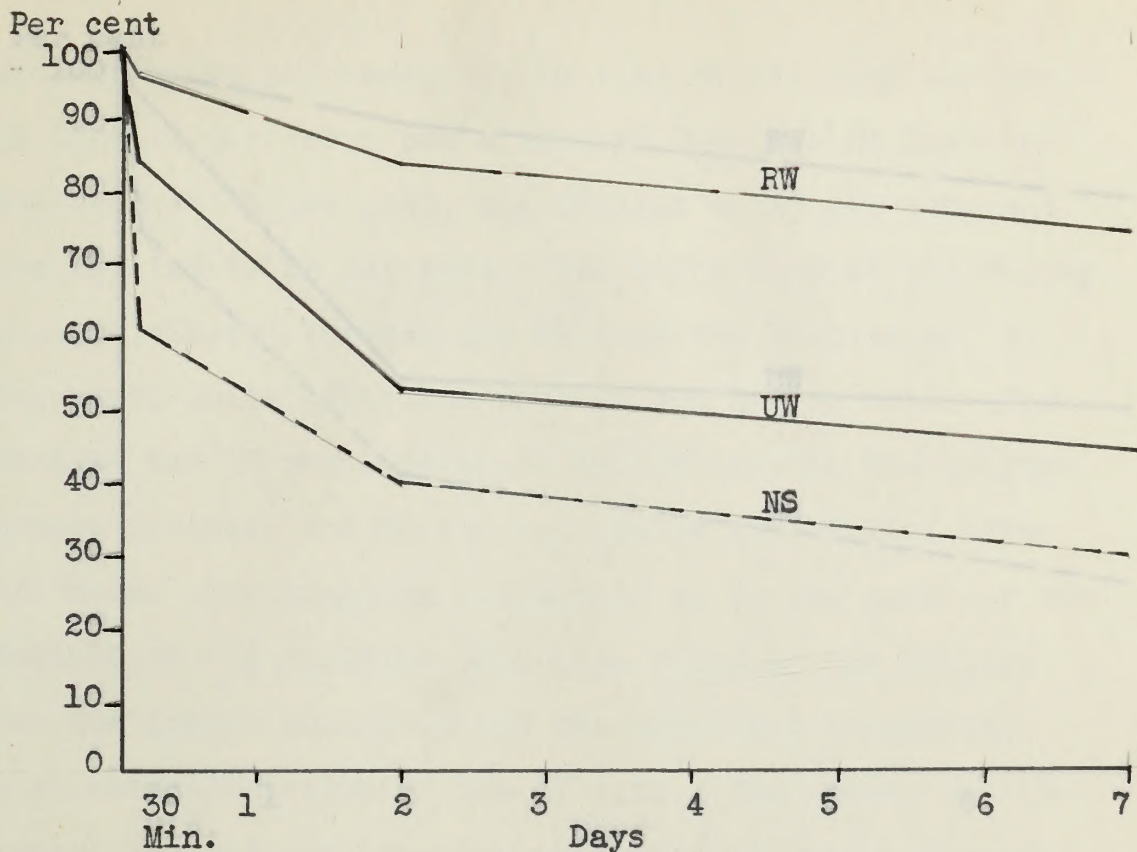


Fig. 8. Retention as Measured by Recall
(Experiment IV)

per cent recalled between the thirty-minute interval and the one-week interval was 29 for the NS list, 37 for the UW list and 22 for the RW list.

This same trend was even more pronounced in Experiment V (equal length lists) where the UW list had a retention value of 94 per cent after thirty minutes compared with 75 per cent for NS list and 97 per cent for the RW list (Figure 9). After forty-eight hours, however, the UW list had fallen to 56 per cent, while the NS list stood

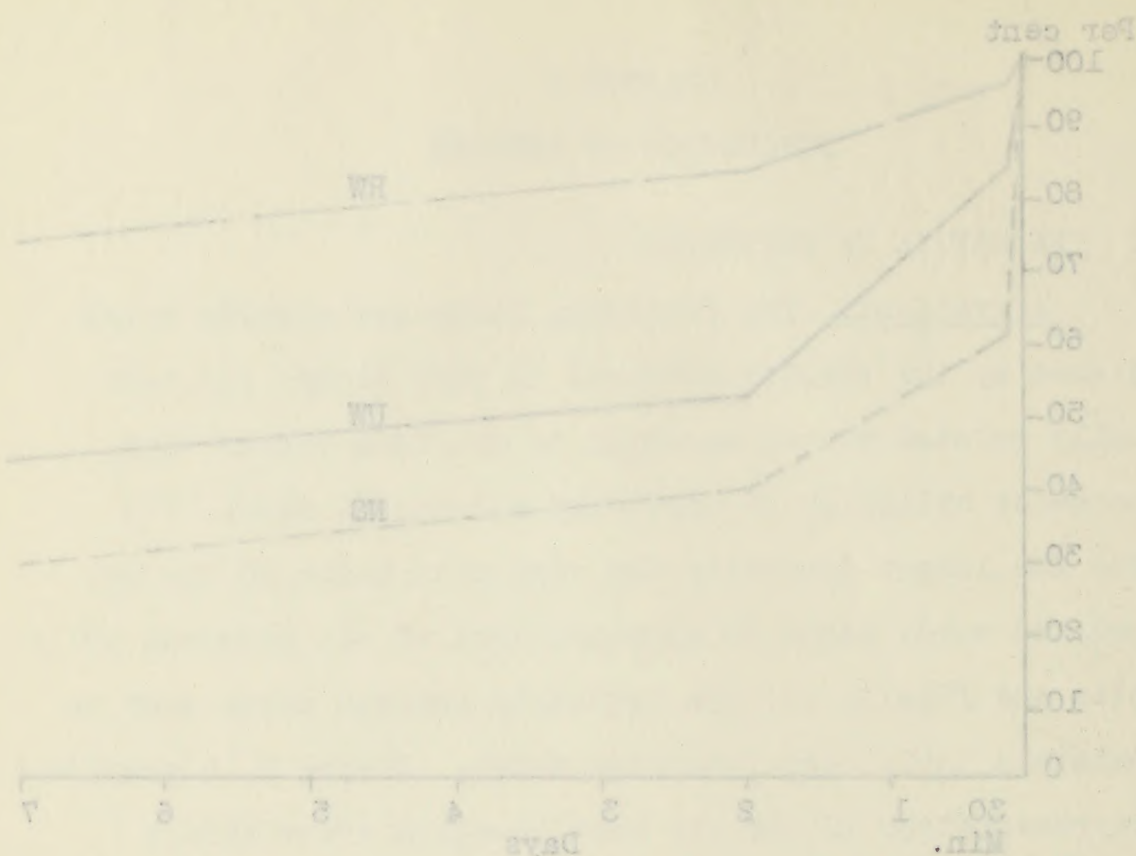


Fig. 8. Retention as Measured by Recall
(Experiment IV)

per cent recalled between the thirty-minute interval and the one-week interval was 22 for the RW list, 27 for the UW list and 22 for the NS list.

This same trend was even more pronounced in Experiment V (equal length lists) where the UW list had a retention value of 24 per cent after thirty minutes compared with 75 per cent for NS list and 27 per cent for the RW list (Figure 9). After forty-eight hours, however, the UW list had fallen to 25 per cent, while the NS list stood

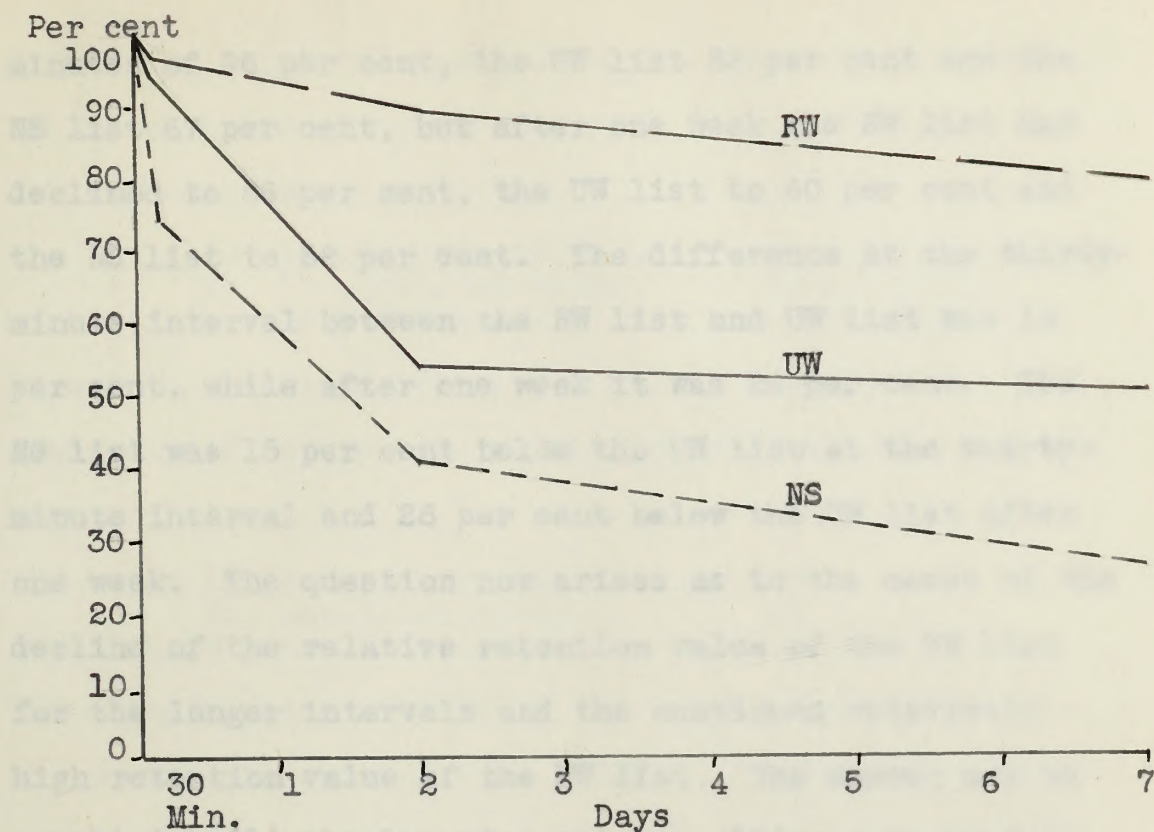


Fig. 9. Retention as Measured by Recall
(Experiment V)

at 42 per cent and the RW list at 90 per cent. At the week interval the UW list had a retention value of 52 per cent, the NS list 28 per cent and the RW list 81 per cent.

In the individually conducted experiment (Experiment II), where a careful attempt was made to have each list learned to the same criterion, and where the time was constant, the results were similar to those obtained in the group experiments discussed above. The RW list, as measured by recall, had a retention value after thirty

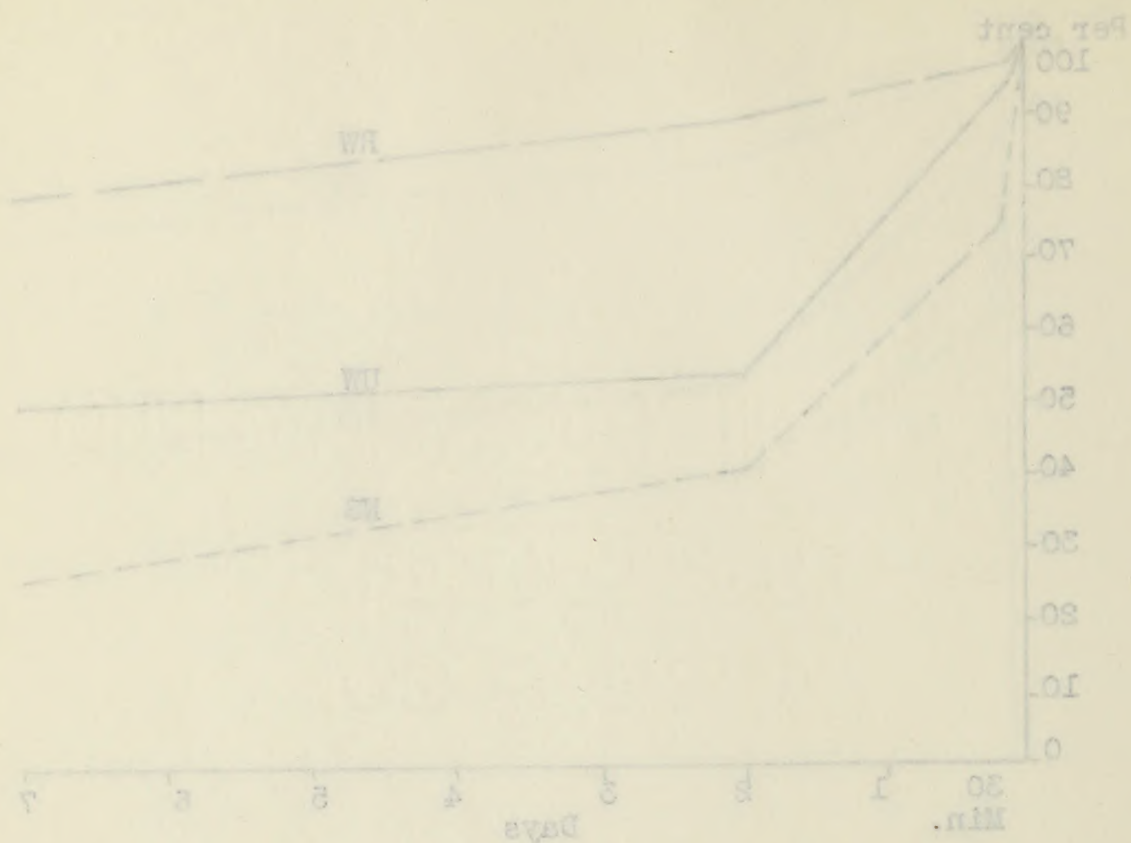


Fig. 9. Retention as Measured by Recall
(Experiment V)

at 45 per cent and the RW list at 20 per cent. At the week interval the UW list had a retention value of 32 per cent, the NS list 28 per cent and the RW list 21 per cent. In the individually conducted experiment (Experiment II), where a careful attempt was made to have each list learned to the same criterion, and where the time was constant, the results were similar to those obtained in the group experiments discussed above. The RW list, as measured by recall, had a retention value after thirty

minutes of 96 per cent, the UW list 82 per cent and the NS list 67 per cent, but after one week the RW list had declined to 86 per cent, the UW list to 60 per cent and the NS list to 32 per cent. The difference at the thirty-minute interval between the RW list and UW list was 14 per cent, while after one week it was 26 per cent. The NS list was 15 per cent below the UW list at the thirty-minute interval and 28 per cent below the UW list after one week. The question now arises as to the cause of the decline of the relative retention value of the UW list for the longer intervals and the continued relatively high retention value of the RW list. The answer may be sought in: (1) the learning process, (2) a neurological explanation and (3) functional observation and description.

Learning facility and retention. There seems to be a high correlation between the facility with which the material is learned and the per cent retained. Kingsley¹ reports that the mean numbers of correct immediate reproductions by 348 subjects after a single presentation of 15 nonsense syllables, 15 sense words and 15 meaningfully related words was:

1. nonsense syllables	4.47
2. unrelated words	9.95
3. logically related words	13.55

¹Howard L. Kingsley, op. cit. page 311

minutes of 36 per cent, the UW list 38 per cent and the
 NS list 37 per cent, but after one week the NW list had
 declined to 36 per cent, the UW list to 30 per cent and
 the NS list to 33 per cent. The difference at the thirty-
 minute interval between the NW list and UW list was 14
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Similarly, Guilford¹ found using the same three lists that the mean number of trials required for complete mastery by 117 subjects was:

- | | | |
|----|-----------------------|-------------|
| 1. | 15 nonsense syllables | 20.4 trials |
| 2. | 15 unrelated words | 8.1 trials |
| 3. | 15 related words | 3.5 trials |

It will be recalled (Table I-A and B) that the mean amount learned in five minutes by the progressive mastery method was:

- | | | |
|----|--------------------|----|
| 1. | nonsense syllables | 9 |
| 2. | unrelated words | 13 |
| 3. | Related words | 16 |

The relative ease with which the three types of material are learned is shown in the results of numerous studies and is a well established fact, but the specific values are a product of method of learning and the measure used. The results in the present study indicate that the per cent recalled follows this same general pattern. The material most readily learned is retained best. The more difficult material (NS) is retained poorly and with difficulty. The increase in the difference in retention value of the RW list and the UW list from the short interval to the longer intervals is not adequately explained, however, simply in terms of learning facility.

¹J. P. Guilford, op. cit. page 122.

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117 subjects was:

1. 15 nonsense syllables	80.4 trials
2. 15 unrelated words	8.1 trials
3. 15 related words	3.8 trials

It will be recalled (Table I-A and B) that the mean amount learned in five minutes by the progressive mastery method

was:

1. 15 nonsense syllables	2
2. 15 unrelated words	13
3. 15 related words	16

The relative ease with which the three types of material are learned is shown in the results of numerous studies and is a well established fact, but the specific values are a product of method of learning and the measure used. The results in the present study indicate that the percent recalled follows this same general pattern. The more material most readily learned is retained best. The more difficult material (NS) is retained poorly and with difficulty. The increase in the difference in retention value of the RW list and the UW list from the short interval to the longer intervals is not adequately explained, however, simply in terms of learning facility.

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Physiological retentiveness. The generally accepted assumption, based on brain pathology and experimentally induced cerebral damage in rats, is that learning produces a more or less permanent change in the nervous system of the organism, and this change is commonly called a "trace" or "residue". The organism's ability to retain is, according to this view, fundamentally determined by its physiological retentive quality. There is no reason to suspect that this inherent quality may be modified (except by pathological conditions); although desire, fatigue, and nutrition may affect its functioning. However interesting a neurological explanation of or speculation about retention might be, we must look elsewhere for an adequate explanation of the differences in the retention of NS, UW and RW by the same individual when these three kinds of material are learned to the same degree and under similar conditions.

Topical tendencies. The associative trends which sustain a topical constellation of associates and which are "retained as residues of former functions" Kingsley¹ has termed topical tendencies. This particular type of functional tendency differs from the simple one-way, chain-

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like associative tendencies. Rote memorizing of items in a fixed sequence, as may be the case in acquiring the ability to conjugate a Latin verb, results in the establishment of associative tendencies set in a train. During recall or recital one item becomes the stimulus which elicits the next one in the sequence learned, and so on to the end of the chain. The strength of the original physical impression may be as great or greater than in the case of the establishment of topical tendencies and yet the retention value may be less. The organization of the topical tendencies is similar to a web rather than a chain. A comprehended principle or a well developed concept, for example, has as its basis an aggregation of associations centering upon the "topic". Thus it has many facets which are open to a whole segment of the individual's experiences, any one of which may be aroused by a wide range of stimuli.

The contrast between this topical pattern of associations and the chain of associations established in memorizing the conjugation of the Latin verb is almost complete, since the proper response in the latter case is dependent upon a very narrow range of stimuli in a rather rigid and perhaps artificial situation. The teacher must often be at some trouble to reconstruct this specific set

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of associations if he is to get the "right" answer. James¹ expressed this concept of memory when he wrote:

"In mental terms, the more other facts a fact is associated with in the mind, the better possession of it our memory retains. Each of its associates becomes a hook to which it hangs, a means to fish it up by when sunk beneath the surface. Together, they form a network of attachments by which it is woven into the entire tissue of our thought."

II THE PHENOMENON OF FORGETTING

The deterioration of the trace. No adequate theory of forgetting in terms of a decay or obliteration of the organic trace has as yet been formulated. Injuries to and pathological changes in the brain do result in forgetting but these are recognized as abnormal losses of memory. Forgetting occurs normally in the absence of these conditions. Furthermore, such a theory does not account for the high retention in old age of childhood memories nor for recall under hypnosis and in delirium. Reminiscence, experimental extinction and the often encountered phenomenon of a perfect recital being followed by two or three incorrect ones are not explained in terms of decay of the memory trace. Neither disuse nor deterioration of the trace can satisfactorily account for the re-

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The significance of meaning. The most fruitful results in the search for an understanding of the superior retention of the RW list can be found in the concept of meaning. This subject has received the attention of a great many experimental psychologists as well as practical educators. Stern¹ defines meaning as a "principle which organizes and structures the material." It is not something which may be added to learning. It accompanies all learning. Rasey² expresses the same point of view when she says of the child new in school:

"Here he sits behind his eyes, his ears, his skin, ordering their intake in terms of his present values. The items that have meaning - any meaning - remain to fuse with previously collected content. Those with no meaning slide off, leaving small residue...What strikes on the retina or vibrates on the inner ear takes its meaning from what crowds in upon it from behind the sensory receptor, and not from what came in with it."

The organism "remembers" that which has meaning for

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Furthermore, the material has meaning to the extent that it has the element of "belongingness" or associative value. Material which constitutes a topical whole, such as the RW list, is easily learned and retained well because it fits into an already existing pattern of tendencies and is comparatively free from the interference, which results when the material has no such organization or meaning for the learner. The UW list while its individual items were familiar to the learner lacked the element of belonging to a general topic such as was present in the case of the RW list. The items which made up the UW had associative bonds with many other items which were not in the list learned; this accounts for the many inclusions in the UW list reproduction which did not occur in the RW list.

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obtained in this study. A high degree of belongingness within the list enables it to resist interference by other learning activities, and the lack of this internal coherence subjects the material to interference by succeeding activities. The NS list is retained less well than the UW list because the former has to an even lesser degree the associative tendencies with previously learned material upon which meaning depends.

An explanation. The results of this study support the thesis that there is a gradient of meaning which largely determines the facility of learning and the degree of retention and that what is commonly called "topical" or logical organization is essential for the most efficient learning and a high grade of retention. The graphic representation of this concept in Figure 10 suggests that the meaning gradient corresponds to the retention gradient.

The NS list, having very few associations, has little meaning and is almost completely lacking in any intra-serial organization. These conditions make learning inefficient and laborious and retention brief and precarious. The only method of combating this is a tremendous increase in the number of repetitions and continued review. The UW list has items which are familiar and thus has associations outside the series. However, they lack coherence

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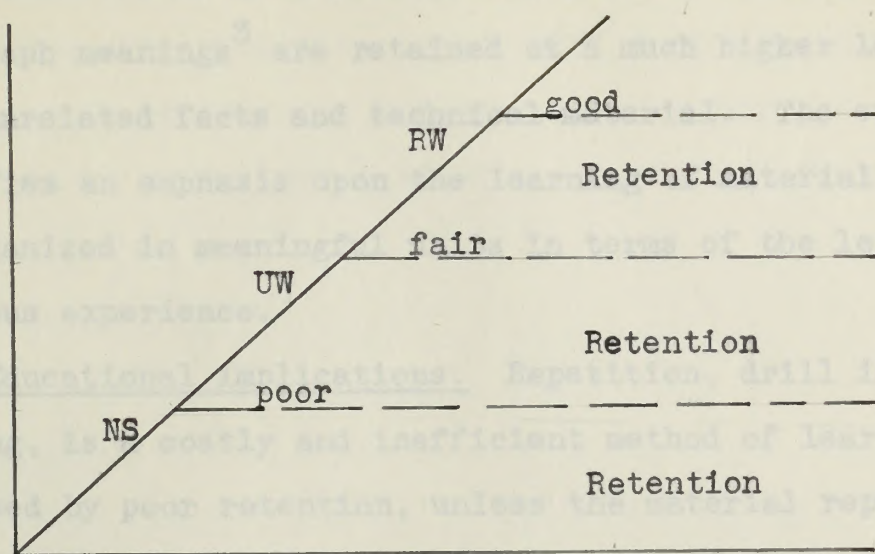


Fig. 10. Meaning Gradient with Suggested Retention Values

because there is no central core or idea about which the members of the series may be organized. Consequently they are learned more readily and retained better than the NS list. The RW list consists not only of items which are familiar and meaningful but in addition they cluster about a central core or topic. They "belong" together because of this topical organization. This composite whole resists interference by other activities and is not only more easily learned but also better retained than the UW list, which lacks this organization. This same phenomenon has been discovered in several studies which

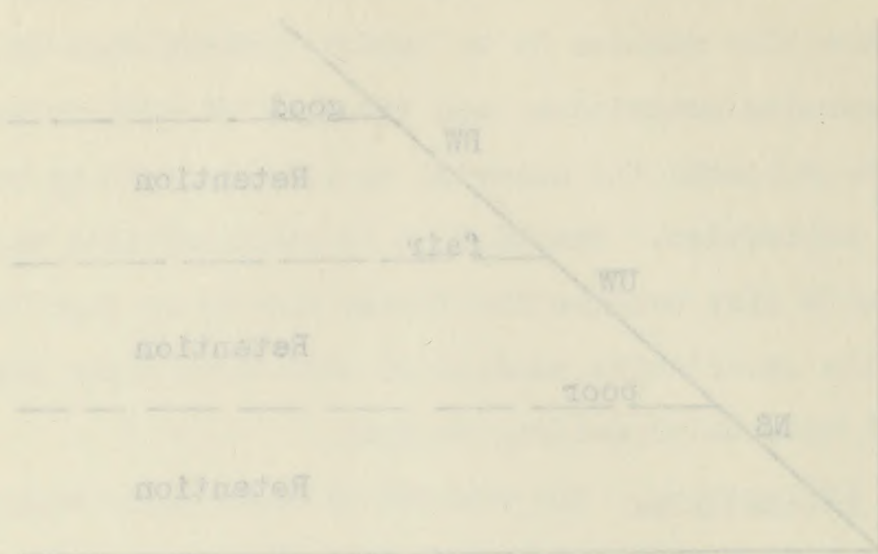


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have demonstrated that principles¹, problem solving² and paragraph meanings³ are retained at a much higher level than unrelated facts and technical material. The evidence justifies an emphasis upon the learning of material which is organized in meaningful units in terms of the learner's previous experience.

Educational implications. Repetition, drill in memorizing, is a costly and inefficient method of learning followed by poor retention, unless the material repeated is highly meaningful to the learner. Meaningful material must be topically organized in terms of the learner's experience if it is to be readily learned and well retained with any degree of permanence. The overwhelming evidence from both psychological laboratory and classroom is that principles, attitudes and methods of work are retained while specific skills, verbatim memorizing and technical terms are retained only until the examination, if indeed

¹R. W. Tyler, "Permanence of Learning," Journal of Higher Education, 1933, 4, 203-204.

²Marie Schrepel and H. R. Laslett, "On the Loss of Knowledge by Junior High-School Pupils Over the Summer Vacation," Journal of Education Psychology, 1936, 27, 299-303.

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that long. Thus conceived the role of the teacher is to create learning situations which will enable the pupil to organize his experiences with greater rapidity and accuracy than he otherwise could, i.e., facilitate learning.

Purpose of Study. The purpose of this study was to investigate the influence of degree of meaning of the learning material upon retention. The learning materials consisted of (1) nonsense syllables, (2) meaningful unrelated words and (3) topically related words. Lists composed of these items were learned under similar conditions and to equivalent degrees of mastery. The retention of each was measured after thirty minutes, forty-eight hours and one week by the same methods. This made possible direct quantitative comparison of the retention value of material varying in degree of meaning.

Procedures. A modification of the complete mastery method called "the progressive mastery method" was devised to make it possible for each subject to learn to the point of complete mastery lists varying in length in a fixed period. A constant learning period of five minutes was used for the three kinds of material. The thirty college students who acted as subjects in the preliminary study learned approximately 9 nonsense syllables, 13 unrelated words and 16 related words.

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CHAPTER VI

SUMMARY AND CONCLUSIONS

RECAPITULATION

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Experiment II. Following the procedure developed in the exploratory phase of the study, 50 college students learned to the point of complete mastery items from each of the three lists for a five-minute period. The retention of each list was measured by written recall and time saved in relearning after thirty minutes and one week.

Group experiments. The study was extended by means of three group experiments. In Experiments III and IV the lists derived in the preliminary investigation were used as comparable learning tasks and, after incomplete learning, retention was measured after thirty minutes, forty-eight hours and one week. The method of retained members was used in testing retention. In Experiment V similar procedures were followed except lists of equal length (16 items) were used.

Results. The retention of the RW list under comparable conditions was higher than that of the UW list after thirty minutes and for the longer intervals of forty-eight hours and one week this superiority of the RW list increased. The NS list showed retention value less than that of the UW list at all intervals tested, but for the longer intervals, forty-eight hours and one week, the difference in retention between NS and UW became less while that between the UW list and the RW list became greater.

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Explanation of results. Retention depends primarily on two factors (a) the strength of the impression and (b) the topical organization of the material. The results suggest that when comparable degrees of mastery are reached (equal impression) the per cent retained varies with the degree of meaning possessed by the learning material. Hence, nonsense material is less readily learned and, when learned, is less well retained than unrelated meaningful material. Further, topically related material is more readily learned than unrelated sense material and better retained than such material. This is explained by the topical organization concept, which views meaning as a structuring or organizing principle which permits new material to fit into an already existing framework. These topically related items thus constitute elements in a functional unit and should be considered a mode of organization rather than specific associations.

Limitations. The results and conclusions of this study are limited by the degree to which the sample used is truly representative of Boston University population and by the degree to which that population adequately represents the universal college population.

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CONCLUSIONS

Within the conditions obtaining in this study the

following conclusions are drawn:

1. Nonsense material is not retained as well as meaningful material when learned to the same criterion.
2. Retention measured by time saved in relearning yields relatively higher values for nonsense material than when measured by recall.
3. Related meaningful material has a relatively high retention at all intervals tested.
4. The learning method and the measure of retention significantly affect the results obtained.
5. At the thirty-minute interval the unrelated meaningful material has, in relation to nonsense syllables and related words, relatively higher retention value than at the forty-eight-hour and one-week intervals.
6. The retention of the unrelated words undergoes, after thirty minutes, a decrement comparable to or greater than the nonsense syllables.
7. For the longer interval the retention value of the unrelated words approaches that of the nonsense syllables.
8. Individual differences as revealed by amount learned and per cent retained is one of the outstanding features of every experiment in the investigation.
9. The correlation between amount learned and per cent recalled declined as the interval was increased.
10. The degree of meaning commonly called "topical" or logical organization is indispensable for facile learning and high permanent retention.

Following conclusions are drawn:

1. Nonsense material is not retained as well as meaningful material when learned to the same criterion.
2. Retention measured by time saved in relearning yields relatively higher values for nonsense material than when measured by recall.
3. Related meaningful material has a relatively high retention at all intervals tested.
4. The learning method and the measure of retention significantly affect the results obtained.
5. At the thirty-minute interval the unrelated meaningful material has, in relation to nonsense syllables and related words, relatively higher retention value than at the forty-eight-hour and one-week intervals.
6. The retention of the unrelated words under- goes, after thirty minutes, a decrease comparable to or greater than the nonsense syllables.
7. For the longer interval the retention value of the unrelated words approaches that of the nonsense syllables.
8. Individual differences as revealed by amount learned and per cent retained is one of the outstanding features of every experiment in the investigation.
9. The correlation between amount learned and per cent recalled declined as the interval was increased.
10. The degree of meaning commonly called "topical" or logical organization is indispensable for facile learning and high permanent retention.

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APPENDIX I

The learning record of each of the subjects tested individually in Experiment II is given on the following pages.

The number appearing in Column P is the serial order of the item presented by E. The corresponding number in Column R is the serial order of the last item correctly recited by S. The last number in Column R marks the total number of items learned by S in the five-minute original learning period. The corresponding number in the relearning period appears under Column R opposite the trial during which S recited correctly the same number of items he had learned in the original learning.

Under written recall appears all the items reproduced by S in the order which he wrote them. Items not appearing in the original list are indicated with an *.

NS - Nonsense syllables
UW - Unrelated words
RW - Related words

T - Trial
P - Presentation by E
R - Recital by S

APPENDIX I

The learning record of each of the subjects tested individually in Experiment II is given on the following pages.

The number appearing in Column P is the serial order of the item presented by S. The corresponding number in Column R is the serial order of the last item correctly recalled by S. The last number in Column R marks the total number of items learned by S in the five-minute original learning period. The corresponding number in the relearning period appears under Column R opposite the trial during which S recalled correctly the same number of items he had learned in the original learning.

Under written recall appears all the items reproduced by S in the order which he wrote them. Items not appearing in the original list are indicated with an *.

NS - Nonsense syllables
 UW - Unrelated words
 RW - Related words
 T - Trial
 P - Presentation by S
 R - Recall by S

LEARNING RECORD

S - 1

Thirty-Minute Interval

Original Learning							Relearning						
U.W.		R.W.		N.S.			U.W.		R.W.		N.S.		
T	P	R	P	R	P	R	P	R	P	R	P	R	
1	1	1	1	1	1	1	0	1	0	3	0	1	
2	2	2	2	2	2	2	2	3	4	7	2	4	
3	3	3	3	3	3	3	4	5	8	8	5	5	
4	4	4	4	4	4	4	6	5	9	7	6	6	
5	5	5	5	5	5	3	6	7	8	9			
6	6	6	6	6	4	1	8	7					
7	7	1	7	7	2	3	8	1					
8	2	6	8	8	4	0	2	3					
9	7	4	9	6	1	1	4	5					
10	5	2	7	2	2	2	6	3					
11	3	4	3	3	3	4	4	5					
12	5	7	4	4	5	1	6	8					
13	8	4	5	8	2	1							
14	5	2	9	8	2	3							
15	3	8	9	9	4	2							
16	9	4	10	9	3	4							
17	5	3	10	7	5	2							
18	4	5	8	9	3	4							
19	6	8	10	8	5	1							
20			9	9	2	4							
21					5	5							
22					6	5							
23					6	6							

Written Recall

Thirty-Minute Interval

U.W.	R.W.	N.S.
market	chair	zab
captain	table	bij
bishop	sofa	keb*
sea-shore*	divan	zib*
	settee	dab*
	davenport	
	seat	
	lounge	
	stool	

LEARNING RECORD

Thirty-Minute Interval

S - 1

Relearning

Original Learning

U.W.	R.W.	N.S.	U.W.	R.W.	N.S.
T	P	R	P	P	R
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17
18	18	18	18	18	18
19	19	19	19	19	19
20	20	20	20	20	20
21	21	21	21	21	21
22	22	22	22	22	22
23	23	23	23	23	23

Written Recall

Thirty-Minute Interval

U.W.	R.W.	N.S.
market	chair	cap
captain	table	big
bishop	sofa	help
sea-shore*	divan	ship
	settee	shape
	davenport	
	seat	
	lounge	
	stool	

LEARNING RECORD

S - 2

Thirty-Minute Interval

Original Learning							Relearning					
U.W.		R.W.		N.S.			U.W.		R.W.		N.S.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	0	0	14	0	5
2	2	2	2	2	2	2			15	16	6	9
3	3	3	3	3	3	3						
4	4	4	4	4	4	4						
5	5	5	5	5	5	5						
6	6	6	6	6	6	1						
7	7	7	7	7	2	4						
8	8	7	8	7	5	6						
9	8	7	8	4	7	7						
10	8	8	5	8	8	7						
11	9	8	9	9	8	5						
12	9	9	10	10	6	8						
13	10	9	11	4	9	8						
14	10	10	5	11	9	8						
15	11	11	12	12	9	9						
16	12	11	13	13	10	7						
17	12	12	14	14	8	8						
18	13	12	15	15	9	9						
19	13	13	16	16								

Written Recall

Thirty-Minute Interval

U.W.	R.W.	N.S.
shoreline	table	zab
temper	chair	bix
bishop	seat	yod
cluster	stool	dib
business	divan	bij
dreamer	sofa	hef
captain	davenport	zec
market	settee	dap
ashes	lounge	kib
uncle	bench	
divorce	bunk	
leather	bed	
pasture	mattress	
	spring	
	sheet	
	linen	

LEARNING RECORD

Thirty-Minute Interval

8 - 2

Original Learning

U.W.	R.W.	N.S.	U.W.	R.W.	N.S.
T	P	R	P	R	P
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17
18	18	18	18	18	18
19	19	19	19	19	19

Written Recall

U.W.	R.W.	N.S.
shoreline	table	zap
temper	chair	pix
blatop	seat	yob
cluster	stool	dip
business	divan	blj
dreamer	sofa	hel
captain	davenport	see
market	settee	gas
ashes	lounge	kib
uncle	bench	
divorce	bank	
leather	bed	
pasture	mattress	
	spring	
	sheet	
	linen	

LEARNING RECORD

S - 3

Thirty-Minute Interval

Original Learning

Relearning

R.W.			N.S.		U.W.		R.W.		N.S.		U.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	14	1	7	0	13
2	2	2	2	2	2	2					14	15
3	3	3	3	3	3	3					16	16
4	4	4	4	4	4	4						
5	5	5	5	5	5	5						
6	6	6	6	4	6	6						
7	7	7	5	5	7	7						
8	8	8	6	1	8	8						
9	9	9	2	3	9	9						
10	10	10	4	6	10	0						
11	11	11	7	1	1	10						
12	12	4	2	4	11	11						
13	5	5	5	6	12	12						
14	6	12	7	4	13	13						
15	13	13	5	6	14	14						
16	14	14	7	7	15	15						
17					16	16						

Written Recall

Thirty-Minute Interval

R.W.	N.S.	U.W.
table	jac*	shoreline
chair	bix	temper
seat	yod	bishop
stool	dib	cluster
divan	zec	business
settee	hef	dreamer
davenport		captain
lounge		market
sofa		ashes
bench		uncle
bed		divorce
bunk		leather
mattress		jacket
springs		pasture
		offence

LEARNING RECORD

S - 4

Thirty-Minute Interval

Original Learning							Relearning						
	N.S.		U.W.		R.W.			N.S.		U.W.		R.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R	
1	1	1	1	1	1	1	0	3	0	4	0	9	
2	2	2	2	2	2	2	4	9	5	7	10	16	
3	3	3	3	3	3	3			8	11			
4	4	4	4	4	4	4			12	3			
5	5	5	5	5	5	5			4	7			
6	6	1	6	6	6	6			8	13			
7	2	4	7	7	7	7							
8	5	1	8	7	8	8							
9	2	4	8	8	9	9							
10	5	3	9	1	10	10							
11	4	6	2	9	11	4							
12	7	0	10	10	5	11							
13	1	3	11	11	12	12							
14	4	7	12	12	13	13							
15	8	3	13	13	14	14							
16	4	7			15	15							
17	8	3			16	16							
18	4	8											
19	9	3											
20	4	8											
21	9	9											

Written Recall

Thirty-Minute Interval

N.S.	U.W.	R.W.
zab	shoreline	table
bix	temper	chair
yod	bishop	seat
dap	cluster	stool
bij	dreamer	divan
zec	captain	settee
hef	market	davenport
keb	ashes	sofa
	uncle	bench
	pasture	bunk
	divorce	bed
		springs
		mattress
		linen
		sheet

LEARNING RECORD

Thirty-Minute Interval

S - 4

Original Learning			Relearning		
N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
7	1	1	7	1	1
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17
18	18	18	18	18	18
19	19	19	19	19	19
20	20	20	20	20	20
21	21	21	21	21	21

Written Recall

Thirty-Minute Interval

N.S.	U.W.	R.W.
zap	shoreline	table
bix	temper	chair
yod	blatop	seat
gap	cluster	stool
blj	greener	divan
zec	captain	settee
het	market	havenport
keb	ashes	sole
	unle	bench
	pasture	bunk
	divorce	bed
		spring
		mattress
		linen
		sheet

LEARNING RECORD

S - 5

Thirty-Minute Interval

Original Learning							Relearning						
	N.S.		U.W.		R.W.			N.S.		U.W.		R.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R	
1	1	1	1	1	1	1	1	1	0	4	0	7	
2	2	2	2	2	2	2	2	2	5	5	8	15	
3	3	3	3	3	3	3	3	3	6	7			
4	4	4	4	4	4	4	4	4	8	10			
5	5	5	5	5	5	5	5	5	11	11			
6	6	1	6	6	6	6	6	7	12	13			
7	2	4	7	7	7	7							
8	5	5	8	7	8	8							
9	6	6	8	8	9	9							
10	7	4	9	9	10	10							
11	5	5	10	10	11	11							
12	6	4	11	11	12	12							
13	5	6	12	12	13	13							
14	7	3	13	13	14	14							
15	4	6			15	15							
16	7	7											

Written Recall

Thirty-Minute Interval

N.S.	U.W.	R.W.
zeb*	shoreline	table
dib	temper	chair
hef	bishop	stool
zab	ashes	settee
had*	captain	divan
	uncle	davenport
	pasture	lounge
	weather	bench
	market	bunk
		bed
		mattress
		springs
		linen

LEARNING RECORD

Thirty-Minute Interval

2 - 8

Original Learning				Relearning			
N.S.	U.W.	R.W.		N.S.	U.W.	R.W.	
7	1	1	1	7	1	1	1
10	2	2	2	10	2	2	2
11	3	3	3	11	3	3	3
12	4	4	4	12	4	4	4
13	5	5	5	13	5	5	5
14	6	6	6	14	6	6	6
15	7	7	7	15	7	7	7
16	8	8	8	16	8	8	8
17	9	9	9	17	9	9	9
18	10	10	10	18	10	10	10
19	11	11	11	19	11	11	11
20	12	12	12	20	12	12	12
21	13	13	13	21	13	13	13
22	14	14	14	22	14	14	14
23	15	15	15	23	15	15	15
24	16	16	16	24	16	16	16
25	17	17	17	25	17	17	17
26	18	18	18	26	18	18	18
27	19	19	19	27	19	19	19
28	20	20	20	28	20	20	20
29	21	21	21	29	21	21	21
30	22	22	22	30	22	22	22
31	23	23	23	31	23	23	23
32	24	24	24	32	24	24	24
33	25	25	25	33	25	25	25
34	26	26	26	34	26	26	26
35	27	27	27	35	27	27	27
36	28	28	28	36	28	28	28
37	29	29	29	37	29	29	29
38	30	30	30	38	30	30	30
39	31	31	31	39	31	31	31
40	32	32	32	40	32	32	32
41	33	33	33	41	33	33	33
42	34	34	34	42	34	34	34
43	35	35	35	43	35	35	35
44	36	36	36	44	36	36	36
45	37	37	37	45	37	37	37
46	38	38	38	46	38	38	38
47	39	39	39	47	39	39	39
48	40	40	40	48	40	40	40
49	41	41	41	49	41	41	41
50	42	42	42	50	42	42	42
51	43	43	43	51	43	43	43
52	44	44	44	52	44	44	44
53	45	45	45	53	45	45	45
54	46	46	46	54	46	46	46
55	47	47	47	55	47	47	47
56	48	48	48	56	48	48	48
57	49	49	49	57	49	49	49
58	50	50	50	58	50	50	50
59	51	51	51	59	51	51	51
60	52	52	52	60	52	52	52
61	53	53	53	61	53	53	53
62	54	54	54	62	54	54	54
63	55	55	55	63	55	55	55
64	56	56	56	64	56	56	56
65	57	57	57	65	57	57	57
66	58	58	58	66	58	58	58
67	59	59	59	67	59	59	59
68	60	60	60	68	60	60	60
69	61	61	61	69	61	61	61
70	62	62	62	70	62	62	62
71	63	63	63	71	63	63	63
72	64	64	64	72	64	64	64
73	65	65	65	73	65	65	65
74	66	66	66	74	66	66	66
75	67	67	67	75	67	67	67
76	68	68	68	76	68	68	68
77	69	69	69	77	69	69	69
78	70	70	70	78	70	70	70
79	71	71	71	79	71	71	71
80	72	72	72	80	72	72	72
81	73	73	73	81	73	73	73
82	74	74	74	82	74	74	74
83	75	75	75	83	75	75	75
84	76	76	76	84	76	76	76
85	77	77	77	85	77	77	77
86	78	78	78	86	78	78	78
87	79	79	79	87	79	79	79
88	80	80	80	88	80	80	80
89	81	81	81	89	81	81	81
90	82	82	82	90	82	82	82
91	83	83	83	91	83	83	83
92	84	84	84	92	84	84	84
93	85	85	85	93	85	85	85
94	86	86	86	94	86	86	86
95	87	87	87	95	87	87	87
96	88	88	88	96	88	88	88
97	89	89	89	97	89	89	89
98	90	90	90	98	90	90	90
99	91	91	91	99	91	91	91
100	92	92	92	100	92	92	92

Thirty-Minute Interval

Written Recall

N.S.	U.W.	R.W.
table	shoreline	
chair	temper	
stool	bishop	
settee	ashes	
divan	captain	
gavenport	uncle	
lounge	pasture	
bench	weather	
bank	market	
bed		
mattress		
spring		
linen		

LEARNING RECORD

S - 6

Thirty-Minute Interval

Original Learning							Relearning					
	N.S.		U.W.		R.W.		N.S.		U.W.		R.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	4	0	13	0	20
2	2	2	2	2	2	2	5	8	14	14		
3	3	3	3	3	3	3						
4	4	4	4	4	4	4						
5	5	1	5	5	5	5						
6	2	5	6	6	6	6						
7	6	4	7	7	7	7						
8	5	6	8	8	8	8						
9	7	6	9	8	9	9						
10	7	4	9	9	10	10						
11	5	7	10	10	11	11						
12	8	7	11	11	12	12						
13	8	4	12	11	13	13						
14	5	7	12	12	14	14						
15	8	7	13	13	15	15						
16	8	8	14	14	16	16						
17			15	13	17	17						
18			14	14	18	18						
19					19	19						
20					20	20						

Written Recall

Thirty-Minute Interval

N.S.	U.W.	R.W.
zab	shoreline	table pillow
hex*	temper	chair dresser
yod	bishop	seat bureau
dib	cluster	stool
zec	business	divan
hef	dreamer	settee
	captain	davenport
	market	sofa
	ashes	bench
	uncle	lounge
	divorce	bunk
	leather	bed
	pasture	mattress
		springs
		linen
		sheet
		quilt

LEARNING RECORD

Thirty-Minute Interval

2 - 6

Relearning

Original Learning

U.S.		U.W.		U.S.		U.W.		U.S.		U.W.	
P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18	18	18	18	18
19	19	19	19	19	19	19	19	19	19	19	19
20	20	20	20	20	20	20	20	20	20	20	20

Thirty-Minute Interval

Written Recall

U.S.		U.W.		U.S.	
P	R	P	R	P	R
asp	asp	shoreline	shoreline	pillow	pillow
hex*	hex*	temper	temper	chair	chair
yod	yod	bishop	bishop	seat	seat
dip	dip	cluster	cluster	stool	stool
zec	zec	business	business	divan	divan
bel	bel	dresser	dresser	settee	settee
		captain	captain	davenport	davenport
		market	market	sofa	sofa
		ashes	ashes	bench	bench
		uncle	uncle	lounge	lounge
		divorce	divorce	bank	bank
		leather	leather	bed	bed
		pasture	pasture	mattress	mattress
				spring	spring
				linen	linen
				sheet	sheet
				curt	curt

LEARNING RECORD

S - 7

Thirty-Minute Interval

Original Learning							Relearning						
	N.S.		U.W.		R.W.			N.S.		U.W.		R.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R	
1	1	1	1	1	1	1	0	7	0	8	0	0	
2	2	2	2	2	2	2	7	7	9	12	10	10	
3	3	3	3	3	3	3	8	8	7	12			
4	4	2	4	4	4	4			13	11			
5	3	4	5	5	5	5			13	10			
6	5	1	6	6	6	6			11	15			
7	2	5	7	7	7	7							
8	6	4	8	8	8	8							
9	5	6	9	8	9	9							
10	7	1	9	0	10	10							
11	2	4	1	9	11	11							
12	5	4	10	10	12	12							
13	5	6	11	11	13	13							
14	7	7	12	12	14	14							
15					15	15							
16					16	16							

Written Recall

Thirty-Minute Interval

N.S.	U.W.	R.W.
zab	shoreline	table
bix	temper	chair
bij	bishop	seat
dib	cluster	stool
yod	business	divan
hef	dreamer	settee
zec	market	davenport
	captain	sofa
	uncle	lounge
	divorce	bench
		bunk
		bed
		mattress
		springs
		linen
		sheet

LEARNING RECORD

Thirty-Minute Interval

8 - 7

Relearning

Original Learning

H.S.		U.W.		H.W.		H.S.		U.W.		H.W.	
T	1	P	1	R	1	P	1	R	1	P	1
1	2	1	2	1	2	1	2	1	2	1	2
2	3	2	3	2	3	2	3	2	3	2	3
3	4	3	4	3	4	3	4	3	4	3	4
4	5	4	5	4	5	4	5	4	5	4	5
5	6	5	6	5	6	5	6	5	6	5	6
6	7	6	7	6	7	6	7	6	7	6	7
7	8	7	8	7	8	7	8	7	8	7	8
8	9	8	9	8	9	8	9	8	9	8	9
9	10	9	10	9	10	9	10	9	10	9	10
10	11	10	11	10	11	10	11	10	11	10	11
11	12	11	12	11	12	11	12	11	12	11	12
12	13	12	13	12	13	12	13	12	13	12	13
13	14	13	14	13	14	13	14	13	14	13	14
14	15	14	15	14	15	14	15	14	15	14	15
15	16	15	16	15	16	15	16	15	16	15	16

Written Recall

Thirty-Minute Interval

H.S.		U.W.		H.W.	
zap		shoreline		table	
bix		temper		chair	
bit		dishop		seat	
dip		cluster		stool	
yod		business		divan	
het		dreamer		settee	
see		market		havenport	
		captain		sofa	
		uncle		lounge	
		divorce		bench	
				bank	
				bed	
				mattress	
				springs	
				linen	
				sheet	

LEARNING RECORD

S - 8

Thirty-Minute Interval

Original Learning							Relearning					
	N.S.		U.W.		R.W.		N.S.		U.W.		R.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	6	0	5	0	9
2	2	2	2	2	2	2	7	7	6	6	10	16
3	3	3	3	3	3	3	8	8	7	12		
4	4	4	4	4	4	4			13	11		
5	5	5	5	5	5	5			12	10		
6	6	5	6	6	6	6			11	15		
7	6	3	7	7	7	4						
8	4	6	8	4	5	7						
9	7	3	5	3	8	8						
10	4	7	4	8	9	9						
11	8	1	9	9	10	10						
12	2	7	10	10	11	11						
13	8	8	11	11	12	12						
14	9	8	12	12	13	13						
15	9	9	13	13	14	14						
16	10	7	14	14	15	15						
17	8	8	15	15	16	16						

Written Recall

Thirty-Minute Interval

N.S.	U.W.	R.W.
zab	shoreline	table
bix	temper	chair
yod	bishop	seat
dib	business	stool
bij	captain	divan
yec	market	settee
hab*	ashes	sofa
hej*	uncle	lounge
	divorce	bed
	jacket	bunk
	offence	mattress
	leather	springs
		linen
		sheet

LEARNING RECORD

Thirty-Minute Interval

8 - 8

Original Learning				Relearning			
H.S.		U.W.		H.S.		U.W.	
T	1	P	1	P	1	P	1
1	2	1	2	1	2	1	2
2	3	2	3	2	3	2	3
3	4	3	4	3	4	3	4
4	5	4	5	4	5	4	5
5	6	5	6	5	6	5	6
6	7	6	7	6	7	6	7
7	8	7	8	7	8	7	8
8	9	8	9	8	9	8	9
9	10	9	10	9	10	9	10
10	11	10	11	10	11	10	11
11	12	11	12	11	12	11	12
12	13	12	13	12	13	12	13
13	14	13	14	13	14	13	14
14	15	14	15	14	15	14	15
15	16	15	16	15	16	15	16
16	17	16	17	16	17	16	17

Thirty-Minute Interval

Written Recall

H.S.		U.W.		R.W.	
cap	table	shoreline	table	table	table
box	chair	tamper	chair	chair	chair
rod	seat	disbop	seat	seat	seat
bit	stool	business	stool	stool	stool
bit	divan	captain	divan	divan	divan
roc	settee	marker	settee	settee	settee
habe	sofa	ashes	sofa	sofa	sofa
haja	lounge	vanla	lounge	lounge	lounge
	bed	divorce	bed	bed	bed
	bank	jacket	bank	bank	bank
	mattress	offence	mattress	mattress	mattress
	spring	leather	spring	spring	spring
	linen		linen	linen	linen
	sheet		sheet	sheet	sheet

LEARNING RECORD

Thirty-Minute Interval

8 - 9

Original Learning				Relearning			
U.W.		R.W.		U.W.		R.W.	
T	1	P	1	P	1	P	1
1	2	1	2	1	2	1	2
2	3	2	3	2	3	2	3
3	4	3	4	3	4	3	4
4	5	4	5	4	5	4	5
5	6	5	6	5	6	5	6
6	7	6	7	6	7	6	7
7	8	7	8	7	8	7	8
8	9	8	9	8	9	8	9
9	10	9	10	9	10	9	10
10	11	10	11	10	11	10	11
11	12	11	12	11	12	11	12
12	13	12	13	12	13	12	13
13	14	13	14	13	14	13	14
14	15	14	15	14	15	14	15
15	16	15	16	15	16	15	16
16	17	16	17	16	17	16	17
17	18	17	18	17	18	17	18
18	19	18	19	18	19	18	19
19	20	19	20	19	20	19	20

Written Recall

Thirty-Minute Interval

U.W.		R.W.	
box	table	bed	
big	chair	linen	
step	seat	sheet	
leaf	stool	mattress	
	divan	spring	
	settee	pillow	
	davenport	quilt	
	sofa	huguenot	
	lounge	dresser	
	bench		
	bank		
shovel			
temper			
bishop			
leather			
ashes			
uncle			
pasture			
divorce			
market			
offence			
jacket			

LEARNING RECORD

S - 10

Thirty-Minute Interval

Original Learning							Relearning					
	U.W.		R.W.		N.S.		U.W.		R.W.		N.S.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	12	0	0	0	0
2	2	2	2	2	2	2	13	13				
3	3	3	3	3	3	3						
4	4	4	4	4	4	4						
5	5	5	5	5	5	4						
6	6	6	6	6	5	5						
7	7	6	7	5	6	5						
8	7	7	6	7	6	6						
9	8	8	8	8	7	6						
10	9	9	9	9	7	7						
11	10	10	10	10	8	8						
12	11	6	11	11	9	9						
13	7	8	12	12	10	7						
14	9	11	13	13	8	9						
15	12	12	14	14	10	7						
16	13	13	15	15	8	8						
17			16	16								
18			17	17								
19			18	18								

Written Recall

Thirty-Minute Interval

U.W.	R.W.	N.S.
shoreline	table	zab
temper	chair	bix
bishop	seat	yod
cluster	stool	dib
business	divan	bij
captain	settee	zec
dreamer	davenport	hef
market	sofa	dap
ashes	lounge	
uncle	bench	
divorce	bunk	
leather	bed	
	mattress	
	springs	
	linen	
	sheet	
	pillow	
	quilt	

LEARNING RECORD

Thirty-Minute Interval

8 - 10

Original Learning		Relearning	
U.W.	R.W.	U.W.	R.W.
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12
13	13	13	13
14	14	14	14
15	15	15	15
16	16	16	16
17	17	17	17
18	18	18	18
19	19	19	19

Thirty-Minute Interval

Written Recall

U.W.	R.W.	N.S.
shoreline	table	zap
temper	chair	bix
bishop	seat	yod
cluster	stool	dib
business	given	blj
captain	settee	zec
dreamer	davenport	hel
market	sofa	gap
ashes	lounge	
uncle	bench	
divorce	brink	
leather	bed	
	mattress	
	springs	
	linen	
	sheet	
	pillow	
	quilt	

LEARNING RECORD

S - 11 Thirty-Minute Interval

Original Learning							Relearning					
	U.W.		R.W.		N.S.		U.W.		R.W.		N.S.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	5	0	16	0	3
2	2	2	2	2	2	2	6	12			4	5
3	3	3	3	3	3	3					6	7
4	4	4	4	4	4	4					8	9
5	5	5	5	5	5	5						
6	6	6	6	6	6	6						
7	7	6	7	7	7	7						
8	7	7	8	8	8	7						
9	8	8	9	9	8	2						
10	9	9	10	10	3	5						
11	10	9	11	11	6	6						
12	10	10	12	12	7	7						
13	11	10	13	13	8	8						
14	11	11	14	14	9	8						
15	12	12	15	15	9	9						
16			16	16	10	9						

Written Recall

Thirty-Minute Interval

U.W.	R.W.	N.S.
shoreline	table	zab
temper	chair	hix*
bishop	seat	yod
cluster	stool	tib*
business	divan	bij
market	settee	hef
captain	sofa	kib
ashes	davenport	
divorce	lounge	
uncle	bench	
leather	bunk	
	bed	
	mattress	
	springs	
	linen	
	sheet	

LEARNING RECORD

Thirty-Minute Interval

S - 11

Relearning

Original Learning

U.W.		R.W.		U.W.		R.W.		U.W.		R.W.	
T	P	R	P	R	P	R	P	R	P	R	P
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16	16	16	16	16

Written Recall

Thirty-Minute Interval

U.W.		R.W.		U.W.	
shovel	table	shovel	table	shovel	table
temper	chair	temper	chair	temper	chair
blanch	seat	blanch	seat	blanch	seat
cluster	stool	cluster	stool	cluster	stool
business	divan	business	divan	business	divan
market	settee	market	settee	market	settee
captain	sofa	captain	sofa	captain	sofa
ashes	davenport	ashes	davenport	ashes	davenport
divorce	lounge	divorce	lounge	divorce	lounge
uncle	bench	uncle	bench	uncle	bench
leather	hunk	leather	hunk	leather	hunk
	bed		bed		bed
	mattress		mattress		mattress
	spring		spring		spring
	linen		linen		linen
	sheet		sheet		sheet

LEARNING RECORD

S - 12

Thirty-Minute Interval

Original Learning							Relearning					
U.W.			R.W.		N.S.		U.W.		R.W.		N.S.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	5	0	16	0	1
2	2	2	2	2	2	2	6	9			2	3
3	3	3	3	3	3	3	10	11			4	4
4	4	4	4	4	4	4	12	12			5	3
5	5	5	5	5	5	3					4	5
6	6	5	6	6	4	5						
7	6	6	7	7	6	6						
8	7	7	8	8	7	2						
9	8	6	9	9	3	4						
10	7	8	10	10	5	5						
11	9	9	11	11	6	3						
12	10	10	12	8	4	5						
13	11	10	9	12	6	4						
14	11	11	13	13	5	5						
15	12	1	14	14	6	4						
16	2	11	15	15	5	5						
17	12	12	16	16								

Written Recall

Thirty-Minute Interval

U.W.	R.W.	N.S.
shoreline	table	zab
temper	chair	yod
bishop	seat	nib*
cluster	stool	biz*
business	divan	
captain	settee	
market	davenport	
ashes	sofa	
divorce	lounge	
	bench	
	bunk	
	springs	
	mattress	
	linen	
	sheet	

LEARNING RECORD

Thirty-Minute Interval

S - 12

Relearning

Original Learning

U.W.		R.W.		N.S.		U.W.		R.W.		N.S.	
T	1	P	1	R	1	P	1	R	1	P	1
1	2	1	2	1	2	1	2	1	2	1	2
2	3	2	3	2	3	2	3	2	3	2	3
3	4	3	4	3	4	3	4	3	4	3	4
4	5	4	5	4	5	4	5	4	5	4	5
5	6	5	6	5	6	5	6	5	6	5	6
6	7	6	7	6	7	6	7	6	7	6	7
7	8	7	8	7	8	7	8	7	8	7	8
8	9	8	9	8	9	8	9	8	9	8	9
9	10	9	10	9	10	9	10	9	10	9	10
10	11	10	11	10	11	10	11	10	11	10	11
11	12	11	12	11	12	11	12	11	12	11	12
12	13	12	13	12	13	12	13	12	13	12	13
13	14	13	14	13	14	13	14	13	14	13	14
14	15	14	15	14	15	14	15	14	15	14	15
15	16	15	16	15	16	15	16	15	16	15	16
16	17	16	17	16	17	16	17	16	17	16	17

Thirty-Minute Interval

Written Recall

U.W.		R.W.		N.S.	
shovel	1	table	1	zap	1
temper	2	chair	2	yo	2
bishop	3	seat	3	nib	3
cluster	4	stool	4	blz	4
business	5	divan	5		
captain	6	settee	6		
market	7	davenport	7		
ashes	8	sofa	8		
divorce	9	lounge	9		
	10	bench	10		
	11	bank	11		
	12	springs	12		
	13	mattress	13		
	14	linen	14		
	15	sheet	15		

LEARNING RECORD

S - 13

Thirty-Minute Interval

Original Learning							Relearning					
U.W.			R.W.		N.S.		U.W.		R.W.		N.S.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	1	6	0	16	0	3
2	2	2	2	2	2	2	7	10			4	8
3	3	3	3	3	3	3	11	8			9	9
4	4	4	4	4	4	4	9	11				
5	5	2	5	5	5	1						
6	3	5	6	6	2	3						
7	6	6	7	7	4	5						
8	7	7	8	8	6	6						
9	8	8	9	9	7	5						
10	9	8	10	6	6	7						
11	9	9	7	10	8	5						
12	10	10	11	11	6	5						
13	11	10	12	12	6	7						
14	11	11	13	13	8	8						
15	12	10	14	14	9	8						
16	11	11	15	15	9	9						
17			16	16								

Written Recall

Thirty-Minute Interval

U.W.	R.W.	N.S.
market	table	zab
temper	chair	bix
bishop	seat	yod
cluster	stool	bij
dreamer	divan	dap
business	settee	zec
ashes	davenport	hef
uncle	sofa	
divorce	lounge	
	bench	
	bunk	
	bed	
	springs	
	mattress	
	linen	
	sheet	

LEARNING RECORD

Thirty-Minute Interval

2 - 13

Original Learning

U.W.	R.W.	N.S.	U.W.	R.W.	N.S.
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17

Written Recall

U.W.	R.W.	N.S.
market	table	zap
temper	chair	dir
bishop	seat	yod
cluster	stool	blj
dreamer	divan	gap
business	settee	see
ashes	davenport	nef
uncle	sofa	
divorce	lounge	
	bench	
	bank	
	bed	
	springs	
	mattress	
	linen	
	sheet	

LEARNING RECORD

S - 14

Thirty-Minute Interval

Original Learning							Relearning					
R.W.			N.S.		U.W.		R.W.		N.S.		U.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	4	0	1	0	4
2	2	2	2	2	2	2	5	7	2	2	5	13
3	3	3	3	3	3	3	8	14	3	3	14	14
4	4	4	4	4	4	4			4	5		
5	5	5	5	1	5	5			6	7		
6	6	6	2	4	6	6			8	3		
7	7	7	5	5	7	7			4	4		
8	8	8	6	6	8	7			5	8		
9	9	7	7	2	8	8						
10	8	9	3	7	9	5						
11	10	10	8	1	6	9						
12	11	6	2	7	10	0						
13	7	11	8	7	1	10						
14	12	7	8	8	11	11						
15	8	12	9	7	12	12						
16	13	8	8	8	13	13						
17	9	13			14	13						
18	14	14			14	14						

Written Recall

Thirty-Minute Interval

R.W.	N.S.	U.W.
table	zeb*	shoreline
chair	bij	temper
seat	dab*	bishop
stool	yod	cluster
divan	neb*	captain
davenport	hef	market
lounge		ashes
sofa		uncle
bed		divorce
bench		pasture
bunk		leather
mattress		
springs		

LEARNING RECORD

Thirty-Minute Interval

2 - 14

Relearning

Original Learning

U.W.		R.W.		U.W.		R.W.		U.W.		R.W.	
P	1	P	1	P	1	P	1	P	1	P	1
4	1	4	1	4	1	4	1	4	1	4	1
13	2	13	2	13	2	13	2	13	2	13	2
14	3	14	3	14	3	14	3	14	3	14	3
	4		4		4		4		4		4
	5		5		5		5		5		5
	6		6		6		6		6		6
	7		7		7		7		7		7
	8		8		8		8		8		8
	9		9		9		9		9		9
	10		10		10		10		10		10
	11		11		11		11		11		11
	12		12		12		12		12		12
	13		13		13		13		13		13
	14		14		14		14		14		14
	15		15		15		15		15		15
	16		16		16		16		16		16
	17		17		17		17		17		17
	18		18		18		18		18		18

Thirty-Minute Interval

Written Recall

U.W.		R.W.		U.W.		R.W.	
shovel	1	shovel	1	shovel	1	shovel	1
temper	2	temper	2	temper	2	temper	2
dish	3	dish	3	dish	3	dish	3
cup	4	cup	4	cup	4	cup	4
cup	5	cup	5	cup	5	cup	5
cup	6	cup	6	cup	6	cup	6
cup	7	cup	7	cup	7	cup	7
cup	8	cup	8	cup	8	cup	8
cup	9	cup	9	cup	9	cup	9
cup	10	cup	10	cup	10	cup	10
cup	11	cup	11	cup	11	cup	11
cup	12	cup	12	cup	12	cup	12
cup	13	cup	13	cup	13	cup	13
cup	14	cup	14	cup	14	cup	14
cup	15	cup	15	cup	15	cup	15
cup	16	cup	16	cup	16	cup	16
cup	17	cup	17	cup	17	cup	17
cup	18	cup	18	cup	18	cup	18

LEARNING RECORD

S - 15

Thirty-Minute Interval

Original Learning							Relearning					
	R.W.		N.S.		U.W.		R.W.		N.S.		U.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	13	0	1	0	5
2	2	2	2	2	2	2			2	8	6	7
3	3	3	3	3	3	3					8	13
4	4	4	4	4	4	4						
5	5	5	5	5	5	5						
6	6	6	6	6	6	5						
7	7	7	7	6	6	6						
8	8	8	7	7	7	7						
9	9	9	8	3	8	7						
10	10	9	4	7	8	8						
11	10	10	8	5	9	9						
12	11	11	6	7	10	10						
13	12	2	8	8	11	5						
14	3	9			6	7						
15	10	12			8	11						
16	13	13			12	12						
17					13	13						

Written Recall

Thirty-Minute Interval

R.W.	N.S.	U.W.
table	zab	shoreline
chair	bij	temper
seat	yod	bishop
stool	dib	cluster
divan	zec	business
settee	dap	captain
lounge	hef	ashes
davenport		uncle
sofa		divorce
bunk		leather
bed		pasture
mattress		

LEARNING RECORD

Thirty-Minute Interval

B - 15

Original Learning

Relearning

R.W.		N.S.		U.W.		R.W.		N.S.		U.W.	
T	1	P	1	P	1	P	1	P	1	P	1
1	2	1	2	1	2	1	2	1	2	1	2
2	3	2	3	2	3	2	3	2	3	2	3
3	4	3	4	3	4	3	4	3	4	3	4
4	5	4	5	4	5	4	5	4	5	4	5
5	6	5	6	5	6	5	6	5	6	5	6
6	7	6	7	6	7	6	7	6	7	6	7
7	8	7	8	7	8	7	8	7	8	7	8
8	9	8	9	8	9	8	9	8	9	8	9
9	10	9	10	9	10	9	10	9	10	9	10
10	11	10	11	10	11	10	11	10	11	10	11
11	12	11	12	11	12	11	12	11	12	11	12
12	13	12	13	12	13	12	13	12	13	12	13
13	14	13	14	13	14	13	14	13	14	13	14
14	15	14	15	14	15	14	15	14	15	14	15
15	16	15	16	15	16	15	16	15	16	15	16
16	17	16	17	16	17	16	17	16	17	16	17

Written Recall

Thirty-Minute Interval

R.W.		N.S.		U.W.	
table	tab	tab	tab	shoreline	shoreline
chair	ch	ch	ch	temper	temper
seat	se	se	se	bishop	bishop
stool	st	st	st	claster	claster
divan	di	di	di	business	business
settee	se	se	se	captain	captain
lounge	lo	lo	lo	ashes	ashes
dayenport	da	da	da	uncle	uncle
sofa	so	so	so	divorce	divorce
punk	pu	pu	pu	leather	leather
bed	be	be	be	pasture	pasture
mattress	ma	ma	ma		

LEARNING RECORD

S - 16

Thirty-Minute Interval

Original Learning

Relearning

R.W.			N.S.			U.W.			R.W.			N.S.			U.W.		
T	P	R	P	R	P	R			P	R		P	R		P	R	
1	1	1	1	1	1	1			0	4		0	1		0	6	
2	2	2	2	2	2	2			5	10		2	3		7	11	
3	3	3	3	3	3	3			11	15		4	5		12	12	
4	4	4	4	4	4	4						6	8		13	10	
5	5	5	5	5	5	5									11	15	
6	6	6	6	5	6	6											
7	7	7	6	5	7	5											
8	8	8	7	5	6	6											
9	9	9	6	4	7	7											
10	10	9	5	7	8	8											
11	10	10	8	7	9	9											
12	11	11	8	8	10	10											
13	12	7	9	8	11	11											
14	8	11	9	7	12	12											
15	12	12	8	8	13	13											
16	13	12			14	14											
17	13	13			15	15											
18	14	12															
19	13	14															
20	15	15															

Written Recall

Thirty-Minute Interval

R.W.	N.S.	U.W.
table	zeb*	shoreline
chair	dic*	temper
seat	yod	bishop
stool	bij	cluster
divan	zec	business
settee	hef	dreamer
sofa	dap	market
davenport		divorce
lounge		uncle
bed		ashes
springs		leather
mattress		
linen		

LEARNING RECORD

Thirty-Minute Interval

2 - 16

Relearning

Original Learning

U.W.		R.W.		U.W.		R.W.		U.W.		R.W.	
P	1	P	1	P	1	P	1	P	1	P	1
6	0	6	0	6	0	6	0	6	0	6	0
11	7	11	3	11	7	11	3	11	7	11	3
12	12	12	4	12	12	12	4	12	12	12	4
13	10	13	8	13	10	13	8	13	10	13	8
14	11	14	6	14	11	14	6	14	11	14	6
15	12	15	11	15	12	15	11	15	12	15	11
16	13	16	10	16	13	16	10	16	13	16	10
17	14	17	9	17	14	17	9	17	14	17	9
18	15	18	8	18	15	18	8	18	15	18	8
19	16	19	7	19	16	19	7	19	16	19	7
20	17	20	6	20	17	20	6	20	17	20	6
21	18	21	5	21	18	21	5	21	18	21	5
22	19	22	4	22	19	22	4	22	19	22	4
23	20	23	3	23	20	23	3	23	20	23	3
24	21	24	2	24	21	24	2	24	21	24	2
25	22	25	1	25	22	25	1	25	22	25	1
26	23	26	0	26	23	26	0	26	23	26	0
27	24	27	11	27	24	27	11	27	24	27	11
28	25	28	10	28	25	28	10	28	25	28	10
29	26	29	9	29	26	29	9	29	26	29	9
30	27	30	8	30	27	30	8	30	27	30	8
31	28	31	7	31	28	31	7	31	28	31	7
32	29	32	6	32	29	32	6	32	29	32	6
33	30	33	5	33	30	33	5	33	30	33	5
34	31	34	4	34	31	34	4	34	31	34	4
35	32	35	3	35	32	35	3	35	32	35	3
36	33	36	2	36	33	36	2	36	33	36	2
37	34	37	1	37	34	37	1	37	34	37	1
38	35	38	0	38	35	38	0	38	35	38	0
39	36	39	11	39	36	39	11	39	36	39	11
40	37	40	10	40	37	40	10	40	37	40	10
41	38	41	9	41	38	41	9	41	38	41	9
42	39	42	8	42	39	42	8	42	39	42	8
43	40	43	7	43	40	43	7	43	40	43	7
44	41	44	6	44	41	44	6	44	41	44	6
45	42	45	5	45	42	45	5	45	42	45	5
46	43	46	4	46	43	46	4	46	43	46	4
47	44	47	3	47	44	47	3	47	44	47	3
48	45	48	2	48	45	48	2	48	45	48	2
49	46	49	1	49	46	49	1	49	46	49	1
50	47	50	0	50	47	50	0	50	47	50	0
51	48	51	11	51	48	51	11	51	48	51	11
52	49	52	10	52	49	52	10	52	49	52	10
53	50	53	9	53	50	53	9	53	50	53	9
54	51	54	8	54	51	54	8	54	51	54	8
55	52	55	7	55	52	55	7	55	52	55	7
56	53	56	6	56	53	56	6	56	53	56	6
57	54	57	5	57	54	57	5	57	54	57	5
58	55	58	4	58	55	58	4	58	55	58	4
59	56	59	3	59	56	59	3	59	56	59	3
60	57	60	2	60	57	60	2	60	57	60	2
61	58	61	1	61	58	61	1	61	58	61	1
62	59	62	0	62	59	62	0	62	59	62	0
63	60	63	11	63	60	63	11	63	60	63	11
64	61	64	10	64	61	64	10	64	61	64	10
65	62	65	9	65	62	65	9	65	62	65	9
66	63	66	8	66	63	66	8	66	63	66	8
67	64	67	7	67	64	67	7	67	64	67	7
68	65	68	6	68	65	68	6	68	65	68	6
69	66	69	5	69	66	69	5	69	66	69	5
70	67	70	4	70	67	70	4	70	67	70	4
71	68	71	3	71	68	71	3	71	68	71	3
72	69	72	2	72	69	72	2	72	69	72	2
73	70	73	1	73	70	73	1	73	70	73	1
74	71	74	0	74	71	74	0	74	71	74	0
75	72	75	11	75	72	75	11	75	72	75	11
76	73	76	10	76	73	76	10	76	73	76	10
77	74	77	9	77	74	77	9	77	74	77	9
78	75	78	8	78	75	78	8	78	75	78	8
79	76	79	7	79	76	79	7	79	76	79	7
80	77	80	6	80	77	80	6	80	77	80	6
81	78	81	5	81	78	81	5	81	78	81	5
82	79	82	4	82	79	82	4	82	79	82	4
83	80	83	3	83	80	83	3	83	80	83	3
84	81	84	2	84	81	84	2	84	81	84	2
85	82	85	1	85	82	85	1	85	82	85	1
86	83	86	0	86	83	86	0	86	83	86	0
87	84	87	11	87	84	87	11	87	84	87	11
88	85	88	10	88	85	88	10	88	85	88	10
89	86	89	9	89	86	89	9	89	86	89	9
90	87	90	8	90	87	90	8	90	87	90	8
91	88	91	7	91	88	91	7	91	88	91	7
92	89	92	6	92	89	92	6	92	89	92	6
93	90	93	5	93	90	93	5	93	90	93	5
94	91	94	4	94	91	94	4	94	91	94	4
95	92	95	3	95	92	95	3	95	92	95	3
96	93	96	2	96	93	96	2	96	93	96	2
97	94	97	1	97	94	97	1	97	94	97	1
98	95	98	0	98	95	98	0	98	95	98	0
99	96	99	11	99	96	99	11	99	96	99	11
100	97	100	10	100	97	100	10	100	97	100	10

Thirty-Minute Interval

Written Recall

U.W.		R.W.		U.W.		R.W.	
showerline	reps	table	table	showerline	reps	table	table
tamp	dice	chair	chair	tamp	dice	chair	chair
blatop	rod	seat	seat	blatop	rod	seat	seat
claster	blj	stool	stool	claster	blj	stool	stool
business	see	divan	divan	business	see	divan	divan
dresser	het	settee	settee	dresser	het	settee	settee
market	dap	sofa	sofa	market	dap	sofa	sofa
divorce		davenport	davenport	divorce		davenport	davenport
uncle		lounge	lounge	uncle		lounge	lounge
ashes		bed	bed	ashes		bed	bed
leather		springs	springs	leather		springs	springs
		mattress	mattress			mattress	mattress
		linen	linen			linen	linen

LEARNING RECORD

S - 17

Thirty-Minute Interval

Original Learning							Relearning					
R.W.		N.S.		U.W.		R.W.		N.S.		U.W.		
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	17	0	2	0	2
2	2	2	2	2	2	2			3	5	3	5
3	3	3	3	3	3	3			6	7	6	10
4	4	4	4	4	4	4			8	8	11	14
5	5	5	5	5	5	5			9	9		
6	6	6	6	4	6	6						
7	7	7	5	6	7	7						
8	8	8	7	3	8	1						
9	9	5	4	5	2	7						
10	6	9	6	7	8	8						
11	10	10	8	8	9	9						
12	11	11	9	8	10	9						
13	12	12	9	9	10	10						
14	13	8			11	10						
15	9	13			11	11						
16	14	8			12	11						
17	9	14			12	12						
18	15	15			13	5						
19	16	16			6	12						
20	17	17			13	13						
21					14	14						

Written Recall

Thirty-Minute Interval

R.W.	N.S.	U.W.
table	zed*	shoreline
chair	bix	temper
seat	bij	cluster
sofa	hef	business
divan	def*	dreamer
davenport	sed*	captain
bench		market
bed		uncle
mattress		ashes
springs		leather
linen		pasture
sheet		offence
pillow		
bunk		
settee		

LEARNING RECORD

Thirty-Minute Interval

S - 17

Relearning

Original Learning

U.W.		R.S.		R.W.		U.W.		R.S.		R.W.	
P	17	P	17	P	17	P	17	P	17	P	17
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18	18	18	18	18
19	19	19	19	19	19	19	19	19	19	19	19
20	20	20	20	20	20	20	20	20	20	20	20
21	21	21	21	21	21	21	21	21	21	21	21

Thirty-Minute Interval

Written Recall

U.W.		R.S.		R.W.	
shoreline	shoreline	shoreline	shoreline	shoreline	shoreline
temper	temper	temper	temper	temper	temper
climate	climate	climate	climate	climate	climate
business	business	business	business	business	business
dresser	dresser	dresser	dresser	dresser	dresser
captain	captain	captain	captain	captain	captain
market	market	market	market	market	market
unlike	unlike	unlike	unlike	unlike	unlike
ashes	ashes	ashes	ashes	ashes	ashes
feather	feather	feather	feather	feather	feather
posture	posture	posture	posture	posture	posture
offense	offense	offense	offense	offense	offense

LEARNING RECORD

S - 18

Thirty-Minute Interval

Original Learning							Relearning					
	R.W.		N.S.		U.W.		R.W.		N.S.		U.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	20	0	0	0	5
2	2	2	2	2	2	2					6	12
3	3	3	3	3	3	3					13	14
4	4	4	4	4	4	4						
5	5	5	5	5	5	5						
6	6	6	6	2	6	6						
7	7	7	3	5	7	7						
8	8	8	6	4	8	6						
9	9	9	5	6	7	8						
10	10	10	7	6	9	9						
11	11	11	7	7	10	4						
12	12	12	8	8	5	6						
13	13	13	9	8	7	9						
14	14	14	9	9	10	10						
15	15	15	10	9	11	11						
16	16	16	10	9	12	11						
17	17	17	10	10	12	12						
18	18	18			13	12						
19	19	19			13	13						
20	20	20			14	12						
21					13	13						
22					14	14						

Written Recall

Thirty-Minute Interval

R.W.		N.S.	U.W.
table	linen	zab	shoreline
chair	sheet	bix	temper
seat	pillow	yod	bishop
stool	quilt	dib	cluster
divan	bureau	bij	business
settee	dresser	zec	divorce
davenport		hef	captain
sofa		dap	market
lounge		kib	ashes
bench		leb	uncle
bunk			leather
bed			offence
mattress			
springs			

LEARNING RECORD

Thirty-Minute Interval

2 - 18

Original Learning				Relearning			
R.W.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.	N.S.
1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18
19	19	19	19	19	19	19	19
20	20	20	20	20	20	20	20
21	21	21	21	21	21	21	21
22	22	22	22	22	22	22	22

Written Recall

Thirty-Minute Interval

R.W.	N.S.	U.W.
table	table	table
chair	chair	chair
seat	seat	seat
stool	stool	stool
divan	divan	divan
settee	settee	settee
davenport	davenport	davenport
sofa	sofa	sofa
lounge	lounge	lounge
bench	bench	bench
bank	bank	bank
bed	bed	bed
mattress	mattress	mattress
spring	spring	spring
linen	linen	linen
sheet	sheet	sheet
pillow	pillow	pillow
quilt	quilt	quilt
divan	divan	divan
dresser	dresser	dresser
bed	bed	bed
chair	chair	chair
sofa	sofa	sofa
lounge	lounge	lounge
bench	bench	bench
bank	bank	bank
bed	bed	bed
mattress	mattress	mattress
spring	spring	spring
linen	linen	linen
sheet	sheet	sheet
pillow	pillow	pillow
quilt	quilt	quilt
divan	divan	divan
dresser	dresser	dresser
bed	bed	bed
chair	chair	chair
sofa	sofa	sofa
lounge	lounge	lounge
bench	bench	bench
bank	bank	bank
bed	bed	bed
mattress	mattress	mattress
spring	spring	spring

LEARNING RECORD

S - 19

Thirty-Minute Interval

Original Learning

Relearning

Original Learning						Relearning						
R.W.		N.S.		U.W.		R.W.		N.S.		U.W.		
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	0	0	3	0	10
2	2	2	2	2	2	2			4	7	11	16
3	3	3	3	3	3	3			8	8		
4	4	4	4	4	4	4			9	10		
5	5	5	5	4	5	5						
6	6	6	5	5	6	6						
7	7	7	6	0	7	7						
8	8	8	1	6	8	8						
9	9	9	7	7	9	9						
10	10	9	8	8	10	10						
11	10	10	9	7	11	10						
12	11	11	8	8	11	11						
13	12	4	9	4	12	12						
14	5	6	5	9	13	12						
15	7	12	10	10	13	13						
16	13	13			14	13						
17	14	14			14	14						
18	15	15			15	15						
19					16	16						

Written Recall

Thirty-Minute Interval

R.W.	N.S.	U.W.
table	zab	shoreline
chair	bix	temper
seat	yod	bishop
stool	dip*	cluster
divan	bij	business
settee	zec	dreamer
davenport	hef	captain
sofa		market
lounge		ashes
bench		uncle
bunk		leather
bed		pasture
mattress		offence
springs		jacket
linen		turnip

LEARNING RECORD

Thirty-Minute Interval

2 - 12

Original Learning

R.W.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.	N.S.	U.W.
P	P	P	P	P	P	P	P	P
1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18	18
19	19	19	19	19	19	19	19	19

Written Recall

R.W.	N.S.	U.W.
table	tab	shoreline
chair	ch	temper
seat	sed	bishop
school	shul	cluster
divan	div	business
settee	set	dresser
davenport	dav	captain
sofa	sof	market
lounge	lou	ashes
bench	ben	uncle
bank	ban	leather
bed	bed	picture
mattress	mat	offence
spring	spri	jacket
linen	lin	turnip

LEARNING RECORD

S - 20

Thirty-Minute Interval

Original Learning							Relearning					
R.W.		N.S.		U.W.		R.W.		N.S.		U.W.		
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	0	0	0	0	17
2	2	2	2	2	2	2						
3	3	3	3	3	3	3						
4	4	4	4	4	4	4						
5	5	5	5	4	5	5						
6	6	6	5	5	6	6						
7	7	7	6	5	7	6						
8	8	4	6	6	7	7						
9	5	8	7	6	8	7						
10	9	9	7	7	8	8						
11	10	10	8	7	9	9						
12	11	11	8	7	10	4						
13	12	12	8	8	5	1						
14	13	12	9	9	2	10						
15	13	13	10	10	11	11						
16	14	14	11	11	12	12						
17	15	6	12	12	13	6						
18	7	8	13	12	7	13						
19	9	15			14	14						
20	16	16			15	15						
21					16	16						
22					17	17						

Written Recall			Thirty-Minute Interval		
R.W.		N.S.	U.W.		
table	mattress	zab	shoreline	pasture	
chair	springs	bix	temper	offence	
seat	linen	yod	bishop	leather	
stool	sheet	dib	cluster	turnip	
divan		bij	business	dessert	
settee		zec	dreamer		
davenport		hef	captain		
sofa		dap	market		
lounge		kib	ashes		
bench		leb	uncle		
bunk		pim	divorce		
bed		nof	jacket		

LEARNING RECORD

Thirty-Minute Interval

S - 20

Original Learning		Relearning	
R.W.	N.S.	R.W.	N.S.
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12
13	13	13	13
14	14	14	14
15	15	15	15
16	16	16	16
17	17	17	17
18	18	18	18
19	19	19	19
20	20	20	20
21	21	21	21
22	22	22	22

Written Recall

Thirty-Minute Interval

R.W.	N.S.	U.W.
table	zab	pasture
chair	bix	offence
seat	rod	leather
stool	dip	turnip
divan	bit	dessert
settee	zec	
avenport	hel	
sofa	dap	
lounge	kib	
bench	leb	
punk	qim	
bed	not	
		shoreline
		temper
		blatop
		elester
		business
		dresser
		captain
		market
		ashes
		uncle
		divorce
		jackpot

LEARNING RECORD

S - 21

Thirty-Minute Interval

Original Learning							Relearning					
	U.W.		R.W.		N.S.		U.W.		R.W.		N.S.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	0	0	0	0	3
2	2	2	2	2	2	2					4	6
3	3	3	3	3	3	3					7	7
4	4	4	4	4	4	3					8	8
5	5	2	5	5	4	4					9	8
6	3	5	6	6	5	3					9	9
7	6	5	7	7	4	4						
8	6	6	8	8	5	5						
9	7	7	9	9	6	6						
10	8	7	10	9	7	7						
11	8	8	10	10	8	8						
12	9	9	11	11	9	7						
13	10	7	12	12	8	8						
14	8	10	13	13	9	9						
15	11	11	14	14								
16	12	12	15	15								
17	13	13	16	16								
18	14	14	17	17								
19	15	15										

Written Recall

Thirty-Minute Interval

U.W.	R.W.	N.S.
shoreline	table	zab
temper	chair	biv*
bishop	seat	yod
cluster	stool	dib
business	divan	zec
dreamer	settee	bij
captain	davenport	hef
market	sofa	kev*
ashes	lounge	
uncle	bench	
divorce	bunk	
leather	bed	
pasture	mattress	
offence	springs	
jacket	linen	
	sheet	
	pillow	

LEARNING RECORD

Thirty-Minute Interval

8 - 21

Original Learning

U.W.	R.W.	N.S.	U.W.	R.W.	N.S.
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17
18	18	18	18	18	18
19	19	19	19	19	19

Thirty-Minute Interval

Written Recall

U.W.	R.W.	N.S.
shoreline	table	zap
temper	chair	blive
bishop	seat	vod
cluster	stool	dip
business	divan	zec
drawner	settee	blj
captain	davenport	hel
market	sala	have
ashes	lounge	
uncle	bench	
divorce	bank	
leather	bed	
pasture	mattress	
offence	spring	
jacket	linen	
	sheet	
	pillow	

LEARNING RECORD

S - 22

Thirty-Minute Interval

Original Learning							Relearning						
	U.W.		R.W.		N.S.			U.W.		R.W.		N.S.	
T	P	R	P	R	P	R		P	R	P	R	P	R
1	1	1	1	1	1	1		0	3	0	0	0	1
2	2	2	2	2	2	2		4	5	10	10	2	5
3	3	3	3	3	3	3		6	11	11	14	6	7
4	4	4	4	4	4	4		12	5			8	1
5	5	5	5	5	5	2		6	8			2	7
6	6	5	6	6	3	3		9	12			8	6
7	6	6	7	7	4	5						7	8
8	7	6	8	8	6	3							
9	7	7	9	9	4	5							
10	8	7	10	7	6	5							
11	8	8	8	4	6	6							
12	9	1	5	10	7	7							
13	2	8	11	11	8	0							
14	9	9	12	12	1	6							
15	10	10	13	13	7	7							
16	11	3	14	14	8	8							
17	4	7	15	15									
18	8	11	16	16									
19	12	3											
20	4	11											
21	12	12											
22	13	12											
23	13	12											

Written Recall

Thirty-Minute Interval

U.W.	R.W.	N.S.
shoreline	table	chair
temper	seat	stool
bishop	divan	settee
business	davenport	sofa
captain	lounge	bench
market	bunk	bed
leather	mattress	springs
ashes	linen	sheet
divorce		
		zab
		biz*
		fec*
		yod
		bij
		dab*
		hef

LEARNING RECORD

Thirty-Minute Interval

8 - 22

Original Learning

U.W.	R.W.	N.S.	U.W.	R.W.	N.S.
T	P	R	P	R	P
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17
18	18	18	18	18	18
19	19	19	19	19	19
20	20	20	20	20	20
21	21	21	21	21	21
22	22	22	22	22	22
23	23	23	23	23	23

Written Recall

Thirty-Minute Interval

U.W.	R.W.	N.S.
shoreline	chair	asp
temper	stool	plax
bishop	settee	few
business	sofa	vod
captain	bench	plj
market	bed	daps
leather	spring	hel
ashes	sheet	
divorce		

LEARNING RECORD

Thirty-Minute Interval

8 - 23

Original Learning

U.W.	R.W.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.	N.S.
1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18	18

Written Recall

Thirty-Minute Interval

U.W.	R.W.	N.S.
shoreline	table	zap
temper	chair	bit
bishop	seat	dec
business	stool	bet
cluster	divan	mjt
ashes	sola	
uncle	havenport	
	settee	
	lounge	
	bed	
	mattress	
	spring	

LEARNING RECORD

S - 24

Thirty-Minute Interval

Original Learning							Relearning					
N.S.			U.W.		R.W.		N.S.		U.W.		R.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	3	0	0	0	0
2	2	2	2	2	2	2	4	7				
3	3	3	3	3	3	3	8	9				
4	4	4	4	4	4	4						
5	5	5	5	5	5	5						
6	6	3	6	6	6	6						
7	4	4	7	7	7	7						
8	5	5	8	8	8	8						
9	6	6	9	9	9	9						
10	7	6	10	9	10	10						
11	7	7	10	10	11	11						
12	8	7	11	10	12	12						
13	8	5	11	11	13	13						
14	6	8	12	12	14	14						
15	9	7	13	12	15	15						
16	8	8	13	13	16	16						
17	9	8	14	14	17	17						
18	9	9	15	14	18	18						
19			15	15								

Written Recall

Thirty-Minute Interval

N.S.	U.W.	R.W.
zab	shoreline	table
bix	temper	chair
yod	bishop	seat
bij	cluster	stool
dap	business	divan
zec	dreamer	settee
hef	captain	davenport
kib	market	sofa
	ashes	lounge
	uncle	bench
	divorce	bunk
	leather	bed
	pasture	mattress
	offence	springs
	jacket	linen
		sheet
		pillow
		quilt

LEARNING RECORD

Thirty-Minute Interval

8 - 24

Original Learning				Retest Learning			
H.S.	U.W.	H.W.	P	H.S.	U.W.	H.W.	P
1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18
19	19	19	19	19	19	19	19

Written Recall

Thirty-Minute Interval

H.S.	U.W.	H.W.
ash	ash	ash
box	box	box
rod	rod	rod
bit	bit	bit
asp	asp	asp
see	see	see
hat	hat	hat
kib	kib	kib
ash	ash	ash
uncle	uncle	uncle
divorce	divorce	divorce
leather	leather	leather
pasture	pasture	pasture
offence	offence	offence
jacket	jacket	jacket
table	table	table
chair	chair	chair
seat	seat	seat
stool	stool	stool
divan	divan	divan
settee	settee	settee
avenport	avenport	avenport
sofa	sofa	sofa
lounge	lounge	lounge
bench	bench	bench
bank	bank	bank
bed	bed	bed
mattress	mattress	mattress
spring	spring	spring
linen	linen	linen
sheet	sheet	sheet
pillow	pillow	pillow
gulf	gulf	gulf

LEARNING RECORD

S - 25

Thirty-Minute Interval

Original Learning

Relearning

Original Learning						Relearning						
N.S.		U.W.		R.W.		N.S.		U.W.		R.W.		
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	4	0	4	0	0
2	2	2	2	2	2	2	5	8	5	5		
3	3	3	3	3	3	3			6	8		
4	4	4	4	4	4	4			9	9		
5	5	4	5	4	5	5			10	11		
6	5	1	5	5	6	6			12	4		
7	2	3	6	6	7	7			5	5		
8	4	5	7	4	8	8			6	12		
9	6	6	5	7	9	9						
10	7	6	8	8	10	10						
11	7	5	9	8	11	11						
12	6	7	9	9	12	12						
13	8	6	10	5	13	7						
14	7	3	6	9	8	13						
15	4	5	10	10	14	4						
16	6	4	11	7	5	13						
17	5	5	8	11	14	14						
18	6	7	12	4								
19	8	8	5	12								

Written Recall

Thirty-Minute Interval

N.S.

U.W.

R.W.

zab

bix

yod

dib

zec

hef

dap

shoreline

temper

bishop

cluster

captain

market

divorce

table

chair

seat

stool

divan

settee

davenport

sofa

lounge

bench

bunk

bed

mattress

springs

LEARNING RECORD

Thirty-Minute Interval

8 - 25

Original Learning		Relearning	
N.S.	U.W.	N.S.	U.W.
P	P	P	P
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12
13	13	13	13
14	14	14	14
15	15	15	15
16	16	16	16
17	17	17	17
18	18	18	18
19	19	19	19

Written Recall

N.S.	U.W.	R.W.
cap	showing	table
bix	teaper	chair
yof	bishop	seat
dip	cluster	stool
see	captain	divan
het	market	settee
bag	divorce	davenport
		sofa
		lounge
		bench
		bank
		bed
		mattress
		spring

LEARNING RECORD

S - 1

One-Week Interval

Original Learning							Relearning					
U.W.		R.W.		N.S.			U.W.		R.W.		N.S.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	5	0	5	1	2
2	2	2	2	2	2	2	6	12	6	8	3	3
3	3	3	3	3	3	3			9	10	4	6
4	4	4	4	4	4	4			11	13	7	7
5	5	5	5	5	5	5			14	17	8	7
6	6	1	6	6	6	5					8	8
7	2	5	7	7	6	4					9	9
8	6	2	8	8	5	6					10	8
9	3	6	9	9	7	3					9	10
10	7	6	10	9	4	4						
11	7	7	10	10	5	6						
12	8	7	11	11	7	7						
13	8	8	12	12	8	2						
14	9	9	13	13	3	7						
15	10	9	13	13	8	8						
16	10	10	14	13	9	8						
17	11	0	14	14	9	9						
18	12	11	15	15	10	0						
19	12	11	16	16	1	9						
20	12	12	17	17	10	6						
21					7	10						
22					11	10						

Written Recall

One-Week Interval

U.W.	R.W.	N.S.
shoreline	table	bix
temper	chair	nab*
bishop	seat	zec
cluster	stool	
business	divan	
market	davenport	
captain	sofa	
ashes	bench	
uncle	bed	
divorce	mattress	
leather	linen	
	sheet	
	pillow	

LEARNING RECORD

One-Week Interval

2 - 1

Original Learning

U.W.	R.W.	R.S.	U.W.	R.W.	R.S.
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17
18	18	18	18	18	18
19	19	19	19	19	19
20	20	20	20	20	20
21	21	21	21	21	21
22	22	22	22	22	22

One-Week Interval

Written Recall

U.W.	R.W.	R.S.
shoreline	table	big
temper	chair	happy
bishop	seat	exc
cluster	stool	
business	divan	
market	havenport	
captain	sofa	
ashes	bench	
uncle	bed	
divorce	mattress	
leather	linen	
	sheet	
	pillow	

LEARNING RECORD

S - 2

One-Week Interval

Original Learning							Relearning					
U.W.			R.W.		N.S.		U.W.		R.W.		N.S.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	1	1	0	16	1	2
2	2	2	2	2	2	2	2	2	0		3	3
3	3	3	3	3	3	3	3	3			4	4
4	4	4	4	4	4	4	4	5			5	5
5	5	5	5	5	5	3	6	6			6	6
6	6	6	6	6	4	4	7	7			7	7
7	7	3	7	7	5	5	8	8			8	8
8	4	6	8	8	6	5	9	10			9	9
9	7	1	9	8	6	6	11	12			9	9
10	2	7	9	9	7	6						
11	8	8	10	10	7	7						
12	9	9	11	11	8	7						
13	10	10	12	12	8	7						
14	11	11	13	13	8	0						
15	12	11	14	14	1	8						
16	12	0	15	15	9	9						
17	1	11	16	16	10	8						
18	12	12			9	9						

Written Recall

One-Week Interval

U.W.	R.W.	N.S.
captain	table	hib*
business	chair	bix
merchant*	stool	dip*
uncle	seat	zib*
leather	davenport	
	settee	
	divan	
	sofa	
	lounge	
	bench	
	bunk	
	bed	
	mattress	
	springs	
	linen	

LEARNING RECORD

One-Week Interval

8 - 2

Relearning

Original Learning

U.W.	R.W.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.	N.S.
T	1	2	3	4	5	6	7	8
1	1	2	3	4	5	6	7	8
2	1	2	3	4	5	6	7	8
3	1	2	3	4	5	6	7	8
4	1	2	3	4	5	6	7	8
5	1	2	3	4	5	6	7	8
6	1	2	3	4	5	6	7	8
7	1	2	3	4	5	6	7	8
8	1	2	3	4	5	6	7	8
9	1	2	3	4	5	6	7	8
10	1	2	3	4	5	6	7	8
11	1	2	3	4	5	6	7	8
12	1	2	3	4	5	6	7	8
13	1	2	3	4	5	6	7	8
14	1	2	3	4	5	6	7	8
15	1	2	3	4	5	6	7	8
16	1	2	3	4	5	6	7	8
17	1	2	3	4	5	6	7	8
18	1	2	3	4	5	6	7	8
19	1	2	3	4	5	6	7	8
20	1	2	3	4	5	6	7	8
21	1	2	3	4	5	6	7	8
22	1	2	3	4	5	6	7	8
23	1	2	3	4	5	6	7	8
24	1	2	3	4	5	6	7	8
25	1	2	3	4	5	6	7	8
26	1	2	3	4	5	6	7	8
27	1	2	3	4	5	6	7	8
28	1	2	3	4	5	6	7	8
29	1	2	3	4	5	6	7	8
30	1	2	3	4	5	6	7	8

One-Week Interval

Written Recall

U.W.	R.W.	N.S.
captain	table	hips
business	chair	bits
merchant	stool	bits
uncle	seat	bits
feather	davenport	bits
	settee	
	divan	
	sofa	
	lounge	
	bench	
	bank	
	bed	
	mattress	
	spring	
	linen	

LEARNING RECORD

S - 3

One-Week Interval

Original Learning							Relearning						
	U.W.		R.W.		N.S.			U.W.		R.W.		N.S.	
T	P	R	P	R	P	R	P	R	P	R	P	R	
1	1	1	1	1	1	1	1	1	0	4	1	1	
2	2	2	2	2	2	2	2	2	5	5	2	2	
3	3	3	3	3	3	3	3	3	6	8	3	4	
4	4	4	4	4	4	4	4	4	9	6	5	1	
5	5	5	5	5	5	3	5	5	7	8	2	5	
6	6	1	6	6	4	4	6	6	6	10			
7	2	4	7	7	5	1	7	1					
8	5	1	8	7	2	4							
9	2	2	8	8	5	1							
10	3	5	9	7	2	3							
11	6	1	8	4	4	5							
12	2	6	5	5	6	3							
13	7	7	6	8	4	3							
14	8	5	9	9	4	1							
15	6	7	10	10	2	5							
16	8	4			6	5							
17	5	6			6	5							
18	7	8											
19	9	8											

Written Recall

One-Week Interval

U.W.

R.W.

N.S.

business
temper
market

table
chair
seat
stool
bench
bunk
sofa
divan
davenport

dib
zib*
yob*

LEARNING RECORD

One-Week Interval

2 - 2

Original Learning

U.W.	R.W.	U.S.	U.W.	R.W.	U.S.
T	P	R	P	R	P
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17
18	18	18	18	18	18
19	19	19	19	19	19

Written Recall

One-Week Interval

U.W.	R.W.	U.S.
business	table	ship
temper	chair	ship
market	seat	yoke
	stool	
	bench	
	bank	
	sole	
	divan	
	davenport	

LEARNING RECORD

S - 4

One-Week Interval

Original Learning							Relearning						
	U.W.		R.W.		N.S.			U.W.		R.W.		N.S.	
T	P	R	P	R	P	R		P	R	P	R	P	R
1	1	1	1	1	1	1		0	1	0	5	1	1
2	2	2	2	2	2	2		2	5	6	10	2	2
3	3	3	3	3	3	3		6	6	11	15	3	3
4	4	4	4	4	4	4		7	7			4	5
5	5	5	5	5	5	2		8	9			6	2
6	6	5	6	6	3	3		10	10			3	6
7	6	6	7	7	4	4						7	2
8	7	6	8	8	5	1						3	3
9	7	7	9	9	2	3						4	3
10	8	8	10	10	4	5						4	6
11	9	9	11	11	6	3						7	7
12	10	10	12	12	4	5							
13	11	6	13	4	6	6							
14	7	3	5	13	7	0							
15	4	9	14	14	1	2							
16	10	10	15	15	3	6							
17					7	7							

Written Recall

One-Week Interval

U.W.

R.W.

N.S.

seashore
cluster
bishop
business
divorce

table
chair
stool
bunk
divan
sofa
davenport
lounge
bed
mattress
springs
linen

bij
zok*
noj*
bic*
tig*

LEARNING RECORD

S - 5

One-Week Interval

Original Learning							Relearning					
U.W.		R.W.		N.S.		U.W.		R.W.		N.S.		
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	9	0	4	1	3
2	2	2	2	2	2	2	10	14	5	9	4	4
3	3	3	3	3	3	3			10	17	5	6
4	4	4	4	4	4	4					7	7
5	5	5	5	5	5	0						
6	6	6	6	6	1	1						
7	7	7	7	7	2	2						
8	8	7	8	8	3	4						
9	8	8	9	9	5	0						
10	9	9	10	9	1	5						
11	10	10	10	10	6	0						
12	11	11	11	11	1	4						
13	12	11	12	12	5	6						
14	12	10	13	13	7	6						
15	11	12	14	14	7	3						
16	13	13	15	15	4	6						
17	14	13	16	16	7	0						
18	14	14	17	17	1	4						
19					5	6						
20					7	7						

Written Recall

One-Week Interval

U.W.	R.W.	N.S.
shoreline	table	yod
temper	chair	bix
bishop	seat	zec
cluster	stool	bef*
business	davenport	
dreamer	settee	
captain	divan	
market	sofa	
ashes	lounge	
leather	bunk	
divorce	bed	
pasture	mattress	
offense	springs	
	linen	
	sheet	
	pillow	

LEARNING RECORD

One-Week Interval

2 - 2

Relearning

Original Learning

U.W.	R.W.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.	N.S.
T	P	R	P	R	P	P	R	P
1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18	18
19	19	19	19	19	19	19	19	19
20	20	20	20	20	20	20	20	20

Written Recall

One-Week Interval

U.W.	R.W.	N.S.
shoreline	table	yod
temper	chair	pix
bishop	seat	zec
cluster	stool	beta
business	davenport	
greener	settee	
captain	divan	
market	sofa	
ashes	lounge	
leather	bench	
divorce	bed	
pasture	mattress	
offense	spring	
	linen	
	sheet	
	pillow	

LEARNING RECORD

S - 6

One-Week Interval

Original Learning							Relearning						
	U.W.		R.W.		N.S.			U.W.		R.W.		N.S.	
T	P	R	P	R	P	R	P	R	P	R	P	R	
1	1	1	1	1	1	1	01	1	0	4	0	1	
2	2	2	2	2	2	2	2	2	5	12	2	2	
3	3	3	3	3	3	3	3	3			3	3	
4	4	2	4	4	4	4	4	4			4	4	
5	3	1	5	5	5	3	5	5			5	5	
6	2	4	6	6	4	4	6	6			6	4	
7	5	1	7	4	5	3	7	9			5	4	
8	2	5	5	7	4	4					5	4	
9	6	5	8	8	5	5					5	6	
10	6	6	9	4	6	3							
11	7	7	5	8	4	3							
12	8	1	9	9	4	6							
13	2	6	10	10	7	5							
14	7	7	11	10	6	2							
15	8	8	11	11	3	5							
16	9	7	12	12	6	6							
17	8	9											
18	10	8											
19	9	9											

Written Recall

One-Week Interval

U.W.	R.W.	N.S.
shoreline	table	zap*
temper	chair	bix
uncle	seat	zac*
market	stool	
circle*	divan	
bishop	sofa	
ashes	davenport	
	lounge	
	bench	
	bunk	
	bed	

LEARNING RECORD

One-Week Interval

S - 6

Original Learning

U.W.	R.W.	N.S.	U.W.	R.W.	N.S.
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17
18	18	18	18	18	18
19	19	19	19	19	19

Written Recall

One-Week Interval

U.W.	R.W.	N.S.
shoreline	table	zaps
temper	chair	plx
uncle	seat	zaps
market	stool	
circle	divan	
bishop	sofa	
ashes	bayonet	
	lounge	
	bench	
	bank	
	bed	

LEARNING RECORD

S - 7

One-Week Interval

Original Learning							Relearning					
	U.W.		R.W.		N.S.		U.W.		R.W.		N.S.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	3	0	4	1	1
2	2	2	2	2	2	2	4	4	5	5	2	2
3	3	3	3	3	3	3	5	5	6	9	3	5
4	4	4	4	4	4	4	6	6	10	16	6	1
5	5	4	5	5	5	1	7	7			2	6
6	5	5	6	6	2	2	8	10			7	7
7	6	5	7	7	3	5	11	12			8	8
8	6	6	8	8	6	1	13	13				
9	7	7	9	9	2	3	14	14				
10	8	7	10	10	4	5						
11	8	8	11	11	6	3						
12	9	9	12	12	4	6						
13	10	10	13	13	7	4						
14	11	11	14	14	5	7						
15	12	12	15	14	8	7						
16	13	12	15	15	8	7						
17	13	13	16	16	8	8						
18	14	13										
19	14	14										

Written Recall

One-Week Interval

U.W.	R.W.	N.S.
shoreline	table	bip*
temper	chair	bij
bishop	seat	
captain	stool	
ashes	davenport	
uncle	divan	
leather	settee	
	sofa	
	lounge	
	bunk	
	bed	
	mattress	
	linen	
	sheet	

LEARNING RECORD

One-Week Interval

8 - 7

Original Learning

U.W.	R.W.	N.S.	U.W.	R.W.	N.S.
T	P	P	P	P	P
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17
18	18	18	18	18	18
19	19	19	19	19	19

One-Week Interval

Written Recall

U.W.	R.W.	N.S.
shovel	table	pipe
temper	chair	plj
blatop	seat	
captain	stool	
ashes	davenport	
uncle	divan	
leather	settee	
	sofa	
	lounge	
	bank	
	bed	
	mattress	
	linen	
	sheet	

LEARNING RECORD

S - 8

One-Week Interval

Original Learning							Relearning					
	N.S.		U.W.		R.W.		N.S.		U.W.		R.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	1	0	1	0	18
2	2	2	2	2	2	2	2	2	2	3		
3	3	3	3	3	3	3	3	3	4	5		
4	4	4	4	4	4	4	4	4	6	6		
5	5	5	5	2	5	5	5	3	7	12		
6	6	4	3	3	6	6	4	5				
7	5	5	4	5	7	7	6	6				
8	6	3	6	6	8	8						
9	4	4	7	7	9	9						
10	5	6	8	8	10	10						
11	7	6	9	9	11	11						
12	7	6	10	9	12	12						
13			10	11	13	13						
14			12	12	14	14						
15			13	12	15	15						
16					16	16						
17					17	17						
18					18	18						

Written Recall

One-Week Interval

N.S.	U.W.	R.W.
zeb*	shoreline	table
duc*	temper	chair
heic*	bishop	seat
hef	business	stool
	captain	divan
	uncle	settee
	divorce	davenport
	market	sofa
	ashes	lounge
	leather	bench
	pasture	bed
		mattress
		spring
		linen
		sheet
		pillow
		quilt

LEARNING RECORD

One-Week Interval

S - 6

Original Learning

U.S.		U.W.		R.W.		U.S.		U.W.		R.W.	
P	1	P	1	P	1	P	1	P	1	P	1
1	2	1	2	1	2	1	2	1	2	1	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18	18	18	18	18

One-Week Interval

Written Recall

U.S.		U.W.		R.W.	
sepe		shoreline		table	
duce		temper		chair	
helce		bishop		east	
hel		business		stool	
		captain		divan	
		uncle		astice	
		divorce		davenport	
		market		sofa	
		ashes		lounge	
		feather		bench	
		pasture		bed	
				mattress	
				spring	
				linen	
				sheet	
				pillow	
				quilt	

LEARNING RECORD

S - 9

One-Week Interval

Original Learning

Relearning

	N.S.		U.W.		R.W.			N.S.		U.W.		R.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R	
1	1	1	1	1	1	1	0	1	1	4	0	2	
2	2	2	2	2	2	2	2	2	5	5	3	4	
3	3	3	3	3	3	3	3	4	6	8	5	6	
4	4	4	4	4	4	4	5	5	9	9	7	8	
5	5	3	5	5	5	5	6	6	10	10	9	9	
6	4	5	6	3	6	6	7	5	11	12	10	10	
7	6	5	4	4	7	7	6	7	13	13	11	14	
8	6	3	5	6	8	8	8	4			15	17	
9	4	6	7	7	9	9	5	5					
10	7	3	8	8	10	10	6	3					
11	4	7	9	9	11	11	4	7					
12	8	7	10	7	12	12	8	3					
13	8	7	8	4	13	13	4	8					
14	8	8	5	9	14	14							
15	9	7	10	10	15	15							
16	8	8	11	10	16	16							
17			11	11	17	17							
18			12	12									
19			13	12									
20			13	13									

Written Recall

One-Week Interval

N.S.	U.W.	R.W.
zab	seashore*	table
yog*	temper	chair
dib	cluster	settee
zap*	doctor*	stool
	market	sofa
	captain	divan
	dreamer	davenport
	leather	bed
	pasture	springs
	picture*	mattress
		pillow
		linen

LEARNING RECORD

One-Week Interval

2 - 2

Original Learning

U.S.	U.W.	R.W.	U.S.	U.W.	R.W.
T	1	1	P	1	1
1	2	2	R	2	2
2	3	3	P	3	3
3	4	4	R	4	4
4	5	5	P	5	5
5	6	6	R	6	6
6	7	7	P	7	7
7	8	8	R	8	8
8	9	9	P	9	9
9	10	10	R	10	10
10	11	11	P	11	11
11	12	12	R	12	12
12	13	13	P	13	13
13	14	14	R	14	14
14	15	15	P	15	15
15	16	16	R	16	16
16	17	17	P	17	17
17	18	18	R	18	18
18	19	19	P	19	19
19	20	20	R	20	20

One-Week Interval

Written Recall

U.S.	U.W.	R.W.
zap	seashore*	table
yo*	temper	chair
dip	cluster	settee
zap*	doctor*	stool
	market	sofa
	captain	divan
	greaser	davenport
	leather	bed
	pasture	spring
	picture*	mattress
		pillow
		linen

LEARNING RECORD

S - 10

One-Week Interval

Original Learning							Relearning						
	N.S.		U.W.		R.W.			N.S.		U.W.		R.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R	
1	1	1	1	1	1	1	1	1	0	1	0	4	
2	2	2	2	2	2	2	2	2	2	3	5	18	
3	3	3	3	3	3	3	3	4	4	5			
4	4	4	4	4	4	4	5	5	6	6			
5	5	1	5	5	5	5	6	1	7	7			
6	2	3	6	5	6	6	2	2	8	8			
7	4	5	6	6	7	7	3	4	9	11			
8	6	2	7	7	8	8	5	3	12	9			
9	3	4	8	8	9	9	4	6	10	12			
10	5	3	9	9	10	10							
11	4	5	10	10	11	11							
12	6	3	11	11	12	12							
13	4	4	12	11	13	13							
14	5	5	12	12	14	14							
15	6	6	13	11	15	15							
16			12	12	16	16							
17					17	17							
18					18	18							

Written Recall

One-Week Interval

N.S.	U.W.	R.W.
xec*	shoreline	table
dij*	steal*	chair
dib	bishop	seat
	business	stool
	divorce	couch*
	uncle	divan
	leather	settee
	forest*	davenport
	market	sofa
		lounge
		bench
		bunk
		bed
		mattress
		springs
		pillow
		linen
		sheet
		quilt
		blanket*

LEARNING RECORD

One-Week Interval

2 - 10

Original Learning				Relearning			
N.S.	U.W.	R.W.		N.S.	U.W.	R.W.	
T	1	1	1	P	1	1	1
1	2	1	2	H	1	2	1
2	3	2	3	1	2	3	2
3	4	3	4	2	3	4	3
4	5	4	5	3	4	5	4
5	6	5	6	4	5	6	5
6	7	6	7	5	6	7	6
7	8	7	8	6	7	8	7
8	9	8	9	7	8	9	8
9	10	9	10	8	9	10	9
10	11	10	11	9	10	11	10
11	12	11	12	10	11	12	11
12	13	12	13	11	12	13	12
13	14	13	14	12	13	14	13
14	15	14	15	13	14	15	14
15	16	15	16	14	15	16	15
16	17	16	17	15	16	17	16
17	18	17	18	16	17	18	17
18		18		17	18		18

Written Recall

One-Week Interval

N.S.	U.W.	R.W.
xece	shovel	pillow
dlj*	steel*	chair
dlp	bishop	seat
	business	stool
	divorce	couch*
	uncle	divan
	leather	settee
	forest*	davenport
	market	sofa
		lounge
		bench
		bank
		bed
		mattress
		spring

LEARNING RECORD

S - 11

One-Week Interval

Original Learning

Relearning

Original Learning							Relearning						
N.S.			U.W.		R.W.		N.S.		U.W.		R.W.		
T	P	R	P	R	P	R	P	R	P	R	P	R	
1	1	1	1	1	1	1	0	1	0	8	0	0	
2	2	2	2	2	2	2	2	4	9	12			
3	3	3	3	3	3	3	5	5	13	13			
4	4	4	4	4	4	4	6	7					
5	5	5	5	5	5	5							
6	6	0	6	6	6	6							
7	1	6	7	7	7	7							
8	7	6	8	5	8	7							
9	7	5	6	7	8	8							
10	6	6	8	8	9	9							
11	7	1	9	6	10	9							
12	2	4	7	8	10	10							
13	5	6	9	9	11	11							
14	7	4	10	10	12	12							
15	7	6	11	11	13	13							
16	7	7	12	12	14	14							
17			13	6	15	15							
18			7	12	16	16							
19			13	13	17	17							
20					18	18							

Written Recall

One-Week Interval

N.S.	U.W.	R.W.
zab	shoreline	table
dib	temper	chair
yak*	bishop	seat
bij	cluster	stool
hef	dreamer	divan
dij*	business	settee
	captain	davenport
	market	sofa
	uncle	lounge
	divorce	bench
	leather	bunk
		bed
		mattress
		springs
		linen
		sheet
		pillow
		quilt

LEARNING RECORD

S - 12

One-Week Interval

Original Learning

Relearning

	N.S.		U.W.		R.W.			N.S.		U.W.		R.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R	
1	1	1	1	1	1	1	0	1	0	1	0	7	
2	2	2	2	2	2	2	2	2	2	2	8	8	
3	3	3	3	3	3	3	3	4	3	3	9	7	
4	4	3	4	4	4	4	5	5	4	4	8	8	
5	4	1	5	5	5	5	6	1	5	5	9	10	
6	2	3	6	5	6	6	2	3	6	6	11	15	
7	4	4	6	6	7	7	4	5	7	8	16	16	
8	5	1	7	7	8	8	6	6	9	9			
9	2	4	8	6	9	9			10	10			
10	5	4	7	7	10	10			11	12			
11	5	2	8	8	11	11							
12	3	5	9	9	12	12							
13	6	1	10	5	13	13							
14	2	3	6	10	14	14							
15	4	5	11	11	15	15							
16	6	2	12	7	16	16							
17	3	5	8	11									
18	6	6	12	12									

Written Recall

One-Week Interval

N.S.	U.W.	R.W.
zab	leather	table
dib	office*	chair
yad*	market	seat
bij	grain*	stool
		davenport
		settee
		divan
		couch*
		bench
		mattress
		bed
		springs
		linen

LEARNING RECORD

S - 13

One-Week Interval

Original Learning							Relearning					
	N.S.		U.W.		R.W.		N.S.		U.W.		R.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	1	0	5	0	16
2	2	2	2	2	2	2	2	4	6	10		
3	3	3	3	3	3	3	5	6	11	11		
4	4	4	4	4	4	4						
5	5	2	5	5	5	5						
6	3	3	6	6	6	6						
7	4	4	7	6	7	7						
8	5	5	7	3	8	8						
9	6	4	4	4	9	9						
10	5	5	5	7	10	10						
11	6	0	8	8	11	11						
12	1	2	9	9	12	12						
13	3	4	10	9	13	13						
14	5	4	10	10	14	14						
15	5	4	11	11	15	15						
16	5	5			16	16						
17	6	6										

Written Recall

One-Week Interval

N.S.	U.W.	R.W.
zab	shoreline	table
bix	temper	chair
yod	bishop	seat
dib	cluster	divan
bif*	business	settee
hef	captain	davenport
	market	couch*
	ashes	lounge
	uncle	sofa
		bench
		bunk
		bed
		springs
		mattress
		linen
		sheet

LEARNING RECORD

One-Week Interval

2 - 13

Original Learning

N.S.	U.W.	R.W.	N.S.	U.W.	R.W.
P	P	P	P	P	P
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17

One-Week Interval

Written Recall

N.S.	U.W.	R.W.
asp	shoreline	table
blx	temper	chair
yob	bishop	seat
dip	cluster	divan
bif*	business	settee
bol	captain	davenport
	market	couch
	sash	lounge
	uncle	sofa
		bench
		bank
		bed
		spring
		mattress
		linen
		sheet

LEARNING RECORD

S - 14

One-Week Interval

Original Learning							Relearning					
N.S.			U.W.		R.W.		N.S.		U.W.		R.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	1	1	0	4	0	5
2	2	2	2	2	2	2	2	2	5	11	6	15
3	3	3	3	3	3	3	3	3	12	12	16	16
4	4	4	4	4	4	4	4	4	13	13		
5	5	5	5	5	5	5	5	6	14	14		
6	6	6	6	6	6	6	7	6	15	15		
7	7	7	7	7	7	7	7	7	16	16		
8	8	7	8	8	8	8	8	1				
9	8	7	9	9	9	9	2	7				
10	8	8	10	10	10	10	8	7				
11	9	9	11	11	11	11	8	7				
12	10	7	12	12	12	12	8	8				
13	8	3	13	13	13	13						
14	4	7	14	14	14	14						
15	8	8	15	15	15	15						
16			16	0	16	16						
17			1	15	17	17						
18			16	16								

Written Recall

One-Week Interval

N.S.	U.W.	R.W.
zec	shoreline	table
zib*	temper	chair
dib	bishop	seat
bec*	cluster	stool
bin*	market	divan
kep*	captain	davenport
dip*	ashes	couch*
	uncle	settee
	divorce	bench
		bunk
		bed
		mattress
		springs
		linen
		sheet
		pillow

LEARNING RECORD

One-Week Interval

S - 14

Original Learning				Relearning			
N.S.	U.W.	R.W.		N.S.	U.W.	R.W.	
T	1	1	1	P	1	1	1
1	2	1	2	P	2	1	2
2	3	2	3	P	3	2	3
3	4	3	4	P	4	3	4
4	5	4	5	P	5	4	5
5	6	5	6	P	6	5	6
6	7	6	7	P	7	6	7
7	8	7	8	P	8	7	8
8	9	8	9	P	9	8	9
9	10	9	10	P	10	9	10
10	11	10	11	P	11	10	11
11	12	11	12	P	12	11	12
12	13	12	13	P	13	12	13
13	14	13	14	P	14	13	14
14	15	14	15	P	15	14	15
15	16	15	16	P	16	15	16
16	17	16	17	P	17	16	17
17	18	17	18	P	18	17	18

Written Recall

One-Week Interval

N.S.	U.W.	R.W.
rec	shoreline	table
zip	temper	chair
dip	blatop	seat
bec	cluster	stool
bin	market	divan
kep	captain	davenport
dip	ashes	couch
	uncle	settee
	divorce	bench
		bank
		bed
		mattress
		spring
		linen
		sheet
		pillow

LEARNING RECORD

S - 15

One-Week Interval

Original Learning							Relearning						
	N.S.		U.W.		R.W.			N.S.		U.W.		R.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R	
1	1	1	1	1	1	1	1	1	1	1	1	8	
2	2	2	2	2	2	2	2	2	6	8	9	17	
3	3	3	3	3	3	3	3	3	9	9			
4	4	4	4	4	4	4	4	4	10	10			
5	5	3	5	4	5	5	5	5	11	11			
6	4	3	5	5	6	6	6	0	12	12			
7	4	4	6	6	7	7	1	5					
8	5	3	7	7	8	8	6	6					
9	4	5	8	5	9	9	7	1					
10	6	6	6	8	10	8	2	6					
11	7	7	9	9	9	10	7	7					
12	8	5	10	10	11	11							
13	6	7	11	11	12	12							
14	8	5	12	4	13	13							
15	6	3	5	11	14	14							
16	4	5	12	11	15	15							
17	6	6	12	11	16	16							
18	7	7	12	12	17	17							

Written Recall

One-Week Interval

N.S.	U.W.	R.W.
zac*	shoreline	table
bij	temper	chair
hej*	bishop	stool
baz*	cluster	divan
bod*	business	settee
	captain	davenport
	market	sofa
	merchant*	bench
		bunk
		bed
		mattress
		springs
		linen
		sheet
		pillow

LEARNING RECORD
One-Week Interval

S - 12

Original Learning

U.S.		U.W.		R.W.		U.S.		U.W.		R.W.	
T	1	P	1	P	1	P	1	P	1	P	1
1	2	1	2	1	2	1	2	1	2	1	2
2	3	2	3	2	3	2	3	2	3	2	3
3	4	3	4	3	4	3	4	3	4	3	4
4	5	4	5	4	5	4	5	4	5	4	5
5	6	5	6	5	6	5	6	5	6	5	6
6	7	6	7	6	7	6	7	6	7	6	7
7	8	7	8	7	8	7	8	7	8	7	8
8	9	8	9	8	9	8	9	8	9	8	9
9	10	9	10	9	10	9	10	9	10	9	10
10	11	10	11	10	11	10	11	10	11	10	11
11	12	11	12	11	12	11	12	11	12	11	12
12	13	12	13	12	13	12	13	12	13	12	13
13	14	13	14	13	14	13	14	13	14	13	14
14	15	14	15	14	15	14	15	14	15	14	15
15	16	15	16	15	16	15	16	15	16	15	16
16	17	16	17	16	17	16	17	16	17	16	17
17	18	17	18	17	18	17	18	17	18	17	18

Written Recall

U.S. U.W. R.W.

sec*	shoreline	table
blj	temper	chair
hej*	blshop	stool
baz*	claster	divan
bod*	business	settee
	captain	davenport
	market	sofa
	merchant*	bench
		bank
		bed
		mattress
		spring
		linen
		sheet
		pillow

LEARNING RECORD

S - 16

One-Week Interval

Original Learning							Relearning					
	U.W.		R.W.		N.S.		U.W.		R.W.		N.S.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	1	0	5	0	3
2	2	2	2	2	2	2	2	2	6	7	4	4
3	3	3	3	3	3	3	3	3	8	8	5	5
4	4	4	4	4	4	4	4	5	9	9	6	6
5	5	5	5	5	5	4	6	7	10	16	7	8
6	6	6	6	6	5	0	8	9			9	8
7	7	4	7	7	1	5	10	11			9	9
8	5	6	8	8	6	5						
9	7	7	9	8	6	5						
10	8	8	9	9	6	6						
11	9	9	10	9	7	6						
12	10	9	10	10	7	6						
13	10	8	11	11	7	7						
14	9	5	12	12	8	3						
15	6	10	13	13	4	7						
16	11	6	14	14	8	8						
17	7	10	15	15	9	8						
18	11	11	16	16	9	9						

Written Recall

One-Week Interval

U.W.	R.W.	N.S.
shoreline	table	zab
business	chair	bix
captain	stool	yod
ashes	divan	dap
divorce	couch*	
market	davenport	
	bunk	
	bed	
	springs	
	mattress	
	sheet	

LEARNING RECORD

One-Week Interval

S - 16

Original Learning

U.W.	R.W.	N.S.	U.W.	R.W.	N.S.
T	P	P	P	P	P
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17
18	18	18	18	18	18

Written Recall

One-Week Interval

U.W.	R.W.	N.S.
shoreline	table	zap
business	chair	plx
captain	stool	yod
ashes	divan	gap
divorce	couch*	
market	davenport	
	bank	
	bed	
	spring	
	mattress	
	sheet	

LEARNING RECORD

S - 17

One-Week Interval

Original Learning							Relearning					
	R.W.		N.S.		U.W.		R.W.		N.S.		U.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	7	0	1	0	1
2	2	2	2	2	2	2	8	12	2	4	2	2
3	3	3	3	3	3	3	13	13	5	5	3	3
4	4	4	4	3	4	4			6	6	4	4
5	5	5	4	4	5	5			7	7	5	5
6	6	6	5	4	6	5			8	8	6	6
7	7	7	5	1	6	6					7	7
8	8	4	2	5	7	7					8	8
9	5	8	6	6	8	7					9	9
10	9	4	7	6	8	8					10	10
11	5	9	7	7	9	9					11	12
12	10	10	8	7	10	10					13	13
13	11	7	8	5	11	11					14	14
14	8	2	6	7	12	12						
15	3	11	8	8	13	13						
16	12	12			14	14						
17	13	13										

Written Recall

One-Week Interval

R.W.	N.S.	U.W.
table	zab	shoreline
chair	bi j	captain
seat	yod	picture*
stool	dab*	leather
divan	hec*	
settee		
davenport		
lounge		
bench		
bed		
mattress		

LEARNING RECORD

One-Week Interval

S - IV

Original Learning

P.W.	M.S.	U.W.	P.W.	M.S.	U.W.
T	1	1	P	1	1
1	2	2	1	2	2
2	3	3	2	3	3
3	4	4	3	4	4
4	5	5	4	5	5
5	6	6	5	6	6
6	7	7	6	7	7
7	8	8	7	8	8
8	9	9	8	9	9
9	10	10	9	10	10
10	11	11	10	11	11
11	12	12	11	12	12
12	13	13	12	13	13
13	14	14	13	14	14
14	15	15	14	15	15
15	16	16	15	16	16
16	17	17	16	17	17

Written Recall

One-Week Interval

P.W.	M.S.	U.W.
table	zap	shoreline
chair	blj	captain
seat	yod	picture*
stool	dbb*	leather
divan	hec*	
settee		
davenport		
lounge		
bench		
bed		
mattress		

LEARNING RECORD

S - 18

One-Week Interval

Original Learning							Relearning					
R.W.			N.S.		U.W.		R.W.		N.S.		U.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	3	1	1	0	2
2	2	2	2	2	2	2	4	8	2	3	3	5
3	3	3	3	3	3	3	9	11	4	4	6	8
4	4	4	4	4	4	4			5	5	9	10
5	5	5	5	1	5	5			6	6	11	13
6	6	6	2	3	6	6			7	7		
7	7	7	4	4	7	7						
8	8	6	5	3	8	8						
9	7	8	4	5	9	9						
10	9	9	6	5	10	10						
11	10	8	6	4	11	11						
12	9	9	5	6	12	11						
13	10	8	7	7	12	12						
14	9	7	8	7	13	9						
15	8	8	8	3	10	12						
16	9	9	4	6	13	13						
17	10	10	7	7								
18	11	11										

Written Recall

One-Week Interval

R.W.	N.S.	U.W.
table	hec*	shoreline
chair	zec	temper
seat	yab*	cluster
sofa	dab*	captain
settee	daf*	market
divan		uncle
davenport		leather
bunk		pasture
bench		

LEARNING RECORD

S - 19

One-Week Interval

Original Learning							Relearning						
	R.W.		N.S.		U.W.			R.W.		N.S.		U.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R	
1	1	1	1	1	1	1	0	7	0	1	0	6	
2	2	2	2	2	2	2	8	8	2	3	7	12	
3	3	3	3	3	3	3	9	9	4	4	13	13	
4	4	4	4	4	4	4	10	10	5	5			
5	5	5	5	3	5	5	11	14	6	7			
6	6	6	4	5	6	5							
7	7	5	6	5	6	6							
8	6	4	6	6	7	7							
9	5	7	7	1	8	8							
10	8	4	2	6	9	9							
11	5	8	7	7	10	9							
12	9	9	8	0	10	10							
13	10	9	1	8	11	11							
14	10	3	9	8	12	11							
15	4	10	9	9	12	12							
16	11	11	10	6	13	11							
17	12	12	7	7	12	12							
18	13	2			13	13							
19	3	13											
20	14	14											

Written Recall

One-Week Interval

R.W.	N.S.	U.W.
table	zed*	shoreline
chair	yod	temper
seat	bix	bishop
stool	hef	cluster
divan	zab	business
settee		dreamer
couch*		market
bed		ashes
bunk		uncle
mattress		leather
		divorce

LEARNING RECORD

One-Week Interval

2 - 12

Relaxing

Original Learning

R.W.		H.S.		U.W.		R.W.		H.S.		U.W.	
7	1	1	2	1	1	7	1	1	2	1	1
8	2	2	3	2	2	8	2	2	3	2	2
9	3	3	4	3	3	9	3	3	4	3	3
10	4	4	5	4	4	10	4	4	5	4	4
11	5	5	6	5	5	11	5	5	6	5	5
12	6	6	7	6	6	12	6	6	7	6	6
13	7	7	8	7	7	13	7	7	8	7	7
14	8	8	9	8	8	14	8	8	9	8	8
15	9	9	10	9	9	15	9	9	10	9	9
16	10	10	11	10	10	16	10	10	11	10	10
17	11	11	12	11	11	17	11	11	12	11	11
18	12	12	13	12	12	18	12	12	13	12	12
19	13	13	14	13	13	19	13	13	14	13	13
20	14	14	15	14	14	20	14	14	15	14	14

Written Recall

One-Week Interval

R.W.		H.S.		U.W.	
table	zed*	zed*	zed*	zed*	zed*
chair	zed*	zed*	zed*	zed*	zed*
seat	zed*	zed*	zed*	zed*	zed*
stool	zed*	zed*	zed*	zed*	zed*
divan	zed*	zed*	zed*	zed*	zed*
settee	zed*	zed*	zed*	zed*	zed*
couch	zed*	zed*	zed*	zed*	zed*
bed	zed*	zed*	zed*	zed*	zed*
bank	zed*	zed*	zed*	zed*	zed*
mattress	zed*	zed*	zed*	zed*	zed*

LEARNING RECORD

S - 20

One-Week Interval

Original Learning							Relearning						
	R.W.		N.S.		U.W.			R.W.		N.S.		U.W.	
T	P	R	P	R	P	R		P	R	P	R	P	R
1	1	1	1	1	1	1		0	7	1	1	0	3
2	2	2	2	2	2	2		8	8	2	2	4	5
3	3	3	3	3	3	3		9	10	3	3	6	6
4	4	4	4	4	4	4	11	14	4	5		7	7
5	5	5	5	3	5	5			6	6		8	8
6	6	6	4	0	6	6			7	7		9	9
7	7	7	1	3	7	7						10	10
8	8	8	4	3	8	8						11	11
9	9	9	4	2	9	9						12	12
10	10	10	3	4	10	10						13	14
11	11	10	5	5	11	11							
12	11	11	6	6	12	6							
13	12	7	7	3	7	12							
14	8	8	4	4	13	12							
15	9	12	5	6	13	13							
16	13	4	7	7	14	14							
17	5	13	8	6									
18	14	14	7	7									

Written Recall

One-Week Interval

R.W.	N.S.	U.W.
table	zac*	shoreline
chair	bij	temper
seat	gib*	business
stool	hef	offence
divan	kev*	bishop
settee		ashes
davenport		divorce
bench		leather
bed		
springs		
mattress		

LEARNING RECORD

One-Week Interval

8 - 20

Original Learning

R.W.		N.S.		R.W.		N.S.		R.W.		N.S.		R.W.		N.S.	
T	1	3	4	5	6	7	8	T	1	3	4	5	6	7	8
1	3	4	5	6	7	8	9	1	3	4	5	6	7	8	9
2	4	5	6	7	8	9	10	2	4	5	6	7	8	9	10
3	5	6	7	8	9	10	11	3	5	6	7	8	9	10	11
4	6	7	8	9	10	11	12	4	6	7	8	9	10	11	12
5	7	8	9	10	11	12	13	5	7	8	9	10	11	12	13
6	8	9	10	11	12	13	14	6	8	9	10	11	12	13	14
7	9	10	11	12	13	14	15	7	9	10	11	12	13	14	15
8	10	11	12	13	14	15	16	8	10	11	12	13	14	15	16
9	11	12	13	14	15	16	17	9	11	12	13	14	15	16	17
10	12	13	14	15	16	17	18	10	12	13	14	15	16	17	18
11	13	14	15	16	17	18	19	11	13	14	15	16	17	18	19
12	14	15	16	17	18	19	20	12	14	15	16	17	18	19	20
13	15	16	17	18	19	20	21	13	15	16	17	18	19	20	21
14	16	17	18	19	20	21	22	14	16	17	18	19	20	21	22
15	17	18	19	20	21	22	23	15	17	18	19	20	21	22	23
16	18	19	20	21	22	23	24	16	18	19	20	21	22	23	24
17	19	20	21	22	23	24	25	17	19	20	21	22	23	24	25
18	20	21	22	23	24	25	26	18	20	21	22	23	24	25	26

One-Week Interval

Written Recall

R.W.		N.S.		R.W.		N.S.	
table	1	2	3	table	1	2	3
chair	2	3	4	chair	2	3	4
seat	3	4	5	seat	3	4	5
stool	4	5	6	stool	4	5	6
divan	5	6	7	divan	5	6	7
settee	6	7	8	settee	6	7	8
dayenport	7	8	9	dayenport	7	8	9
bench	8	9	10	bench	8	9	10
bed	9	10	11	bed	9	10	11
springs	10	11	12	springs	10	11	12
mattress	11	12	13	mattress	11	12	13

shoreline
temper
business
offence

each
bit
ship
help
kay

LEARNING RECORD

S - 21

One-Week Interval

Original Learning							Relearning						
	R.W.		N.S.		U.W.			R.W.		N.S.		U.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R	
1	1	1	1	1	1	1	0	2	0	2	0	3	
2	2	2	2	2	2	2	3	3	3	3	4	5	
3	3	3	3	3	3	3	4	7	4	2	6	6	
4	4	4	4	4	4	4	8	13	3	5	7	7	
5	5	5	5	4	5	4			6	3	8	8	
6	6	6	5	0	5	5			4	6	9	12	
7	7	7	1	3	6	6					13	13	
8	8	8	4	0	7	7					14	14	
9	9	5	1	1	8	8							
10	6	8	2	2	9	9							
11	9	9	3	4	10	9							
12	10	10	5	2	10	10							
13	11	10	3	3	11	11							
14	11	11	4	5	12	12							
15	12	12	6	6	13	5							
16	13	13	7	3	6	7							
17			7	5	8	13							
18			6	4	14	14							
19			5	5									
20			6	6									

Written Recall

One-Week Interval

R.W.

N.S.

U.W.

table
chair
sofa
davenport
settee
divan
lounge
bunk
bench
bed
mattress

zab
bik*
mej*
rec*
fuc*
yab*

seashore*
temper
bishop
ashes
divorce
leather

LEARNING RECORD One-Week Interval

8 - 21

Original Learning

R.W.	N.S.	U.W.	R.W.	N.S.	U.W.
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17
18	18	18	18	18	18
19	19	19	19	19	19
20	20	20	20	20	20

Written Recall

R.W.	N.S.	U.W.
table	cap	seashore
chair	plate	temper
sofa	maple	bishop
bavenport	rect	ashes
settee	luc	divorce
divan	yoke	feather
lounge		
bank		
bench		
bed		
mattress		

LEARNING RECORD

S - 22

One-Week Interval

Original Learning							Relearning						
	R.W.		N.S.		U.W.			R.W.		N.S.		U.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R	
1	1	1	1	1	1	1	0	7	0	1	0	1	
2	2	2	2	2	2	2	8	8	2	3	2	3	
3	3	3	3	3	3	3	9	9	4	4	4	4	
4	4	4	4	4	4	4	10	14	5	5	5	5	
5	5	5	5	1	5	5			6	6	6	6	
6	6	6	2	2	6	2			7	8	7	7	
7	7	7	3	3	3	6					8	8	
8	8	4	4	4	7	2					9	9	
9	5	8	5	5	3	4					10	11	
10	9	9	6	5	5	6					12	11	
11	10	4	6	6	7	7					12	13	
12	5	7	7	1	8	8							
13	8	3	2	5	9	9							
14	4	10	6	7	10	10							
15	11	11	8	8	11	10							
16	12	12	9	7	11	11							
17	13	13	8	7	12	12							
18	14	14	8	8	13	13							

Written Recall

One-Week Interval

R.W.	N.S.	U.W.
table	yod	shoreline
chair	dap	bishop
seat	bij	divorce
stool		cluster
divan	ref	business
settee	dap	captain
davenport	lib	market
bunk		ashes
bed		spole
springs		divorce
mattress		pasture
bed		leather
mattress		offence

LEARNING RECORD

One-Week Interval

8 - 22

Original Learning

R.W.	R.S.	U.W.	R.W.	R.S.	U.W.	R.W.	R.S.	U.W.
1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18	18

Written Recall

One-Week Interval

R.W.	R.S.	U.W.
table	you	shoreline
chair	dap	blisop
seat	blj	divorce
stool		
divan		
settee		
avenue		
bank		
bed		
springs		
mattress		

LEARNING RECORD

S - 23

One-Week Interval

Original Learning							Relearning					
R.W.			N.S.		U.W.		R.W.		N.S.		U.W.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	13	0	4	1	1
2	2	2	2	2	2	2			5	5	2	5
3	3	3	3	3	3	3			6	9	6	14
4	4	4	4	4	4	4						
5	5	5	5	1	5	5						
6	6	6	2	2	6	5						
7	7	7	3	3	6	6						
8	8	8	4	3	7	7						
9	9	9	4	4	8	8						
10	10	10	5	5	9	9						
11	11	11	6	5	10	9						
12	12	6	6	4	10	10						
13	7	12	5	6	11	11						
14	13	12	7	7	12	11						
15	13	13	8	7	12	12						
16			8	8	13	13						
17			9	8	14	14						
18			9	9								

Written Recall

One-Week Interval

R.W.	N.S.	U.W.
table	zab	coastline*
chair	bix	basket*
seat	yod	bishop
stool	dib	cluster
divan	hef	business
sofa	dap	captain
davenport	kib	market
settee		ashes
bench		uncle
lounge		divorce
bunk		pasture
bed		leather
mattress		offence
spring		offence
linen		jabot
sheet		
pillow		

LEARNING RECORD
One-Week Interval

8 - 83

Original Learning				Relearning			
R.W.		N.S.		R.W.		N.S.	
P	1	P	1	P	1	P	1
1	2	1	2	1	2	1	2
2	3	2	3	2	3	2	3
3	4	3	4	3	4	3	4
4	5	4	5	4	5	4	5
5	6	5	6	5	6	5	6
6	7	6	7	6	7	6	7
7	8	7	8	7	8	7	8
8	9	8	9	8	9	8	9
9	10	9	10	9	10	9	10
10	11	10	11	10	11	10	11
11	12	11	12	11	12	11	12
12	13	12	13	12	13	12	13
13	14	13	14	13	14	13	14
14	15	14	15	14	15	14	15
15	16	15	16	15	16	15	16
16	17	16	17	16	17	16	17
17	18	17	18	17	18	17	18

Written Recall
One-Week Interval

R.W.		N.S.		U.W.	
Table	zap	coastline*			
chair	six	basin*			
seat	rod	blatop			
stool	dip	cluster			
divan	bat	business			
sofa	gap	captain			
davenport	kip	market			
settee		ashes			
bench		uncle			
lounge		divorce			
bank		pasture			
bed		leather			
mattress		offense			

LEARNING RECORD

S - 24

One-Week Interval

Original Learning							Relearning						
	R.W.		N.S.		U.W.			R.W.		N.S.		U.W.	
T	P	R	P	R	P	R		P	R	P	R	P	R
1	1	1	1	1	1	1		0	10	1	1	0	10
2	2	2	2	2	2	2		11	17	2	3	11	15
3	3	3	3	3	3	3		18	18	4	2		
4	4	4	4	4	4	4				3	5		
5	5	5	5	5	5	5				6	6		
6	6	6	6	6	6	6				7	7		
7	7	7	7	3	7	7				8	8		
8	8	8	4	1	8	8				9	7		
9	9	9	2	6	9	9				8	9		
10	10	9	7	4	10	9							
11	10	10	5	7	10	10							
12	11	11	8	3	11	11							
13	12	12	4	8	12	11							
14	13	13	9	9	12	12							
15	14	14			13	13							
16	15	15			14	13							
17	16	16			14	14							
18	17	17			15	15							
19	18	18											

Written Recall

One-Week Interval

R.W.	N.S.	U.W.
table	bog*	shoreline
chair	bij	temper
seat	mab*	bishop
stool	dib	cluster
settee	hec*	business
divan	jib*	dreamer
sofa		captain
davenport		market
lounge		ashes
bench		uncle
bed		leather
mattress		pasture
springs		offence
linen		jacket
sheet		
pillow		

LEARNING RECORD

One-Week Interval

B - 24

Original Learning

R.W.	N.S.	U.W.	R.W.	N.S.	U.W.	R.W.	N.S.	U.W.
T	1	1	P	1	1	P	1	1
1	2	2	1	2	2	1	2	2
2	3	3	2	3	3	2	3	3
3	4	4	3	4	4	3	4	4
4	5	5	4	5	5	4	5	5
5	6	6	5	6	6	5	6	6
6	7	7	6	7	7	6	7	7
7	8	8	7	8	8	7	8	8
8	9	9	8	9	9	8	9	9
9	10	10	9	10	10	9	10	10
10	11	11	10	11	11	10	11	11
11	12	12	11	12	12	11	12	12
12	13	13	12	13	13	12	13	13
13	14	14	13	14	14	13	14	14
14	15	15	14	15	15	14	15	15
15	16	16	15	16	16	15	16	16
16	17	17	16	17	17	16	17	17
17	18	18	17	18	18	17	18	18
18	19	19	18	19	19	18	19	19

Written Recall

One-Week Interval

R.W.	N.S.	U.W.
table	bag*	shoreline
chair	blj	temper
seat	mb*	blshop
stool	dlb	claster
settee	pac*	business
divan	tip*	dresser
sofa		captain
davenport		marker
lounge		ashes
bench		uncle
bed		leather
mattress		pasture
spring		offence
linen		jacket
sheet		
pillow		

LEARNING RECORD

S - 25

One-Week Interval

Original Learning							Relearning					
U.W.		R.W.		N.S.			U.W.		R.W.		N.S.	
T	P	R	P	R	P	R	P	R	P	R	P	R
1	1	1	1	1	1	1	0	5	0	9	1	1
2	2	2	2	2	2	2	6	7	10	15	2	3
3	3	3	3	3	3	3	8	11			4	6
4	4	4	4	4	4	4					7	8
5	5	5	5	5	5	3					9	9
6	6	6	6	6	4	4					10	8
7	7	3	7	7	5	5					9	10
8	4	5	8	8	6	6						
9	6	3	9	9	7	6						
10	6	7	10	4	7	6						
11	8	8	5	8	7	7						
12	9	9	9	10	8	8						
13	10	7	11	11	9	8						
14	8	9	12	12	9	9						
15	10	10	13	13	10	8						
16	11	11	14	14	9	9						
17	12	10	15	14	10	10						
18	11	11	15	15								

Written Recall

One-Week Interval

U.W.	R.W.	N.S.
shoreline	table	yod
temper	chair	zec
bishop	seat	bij
cluster	stool	dap
business	divan	
ashes	settee	
captain	davenport	
merchant*	sofa	
uncle	lounge	
divorce	bed	
leather*	mattress	
	springs	
	linen	

LEARNING RECORD

One-Week Interval

A - 25

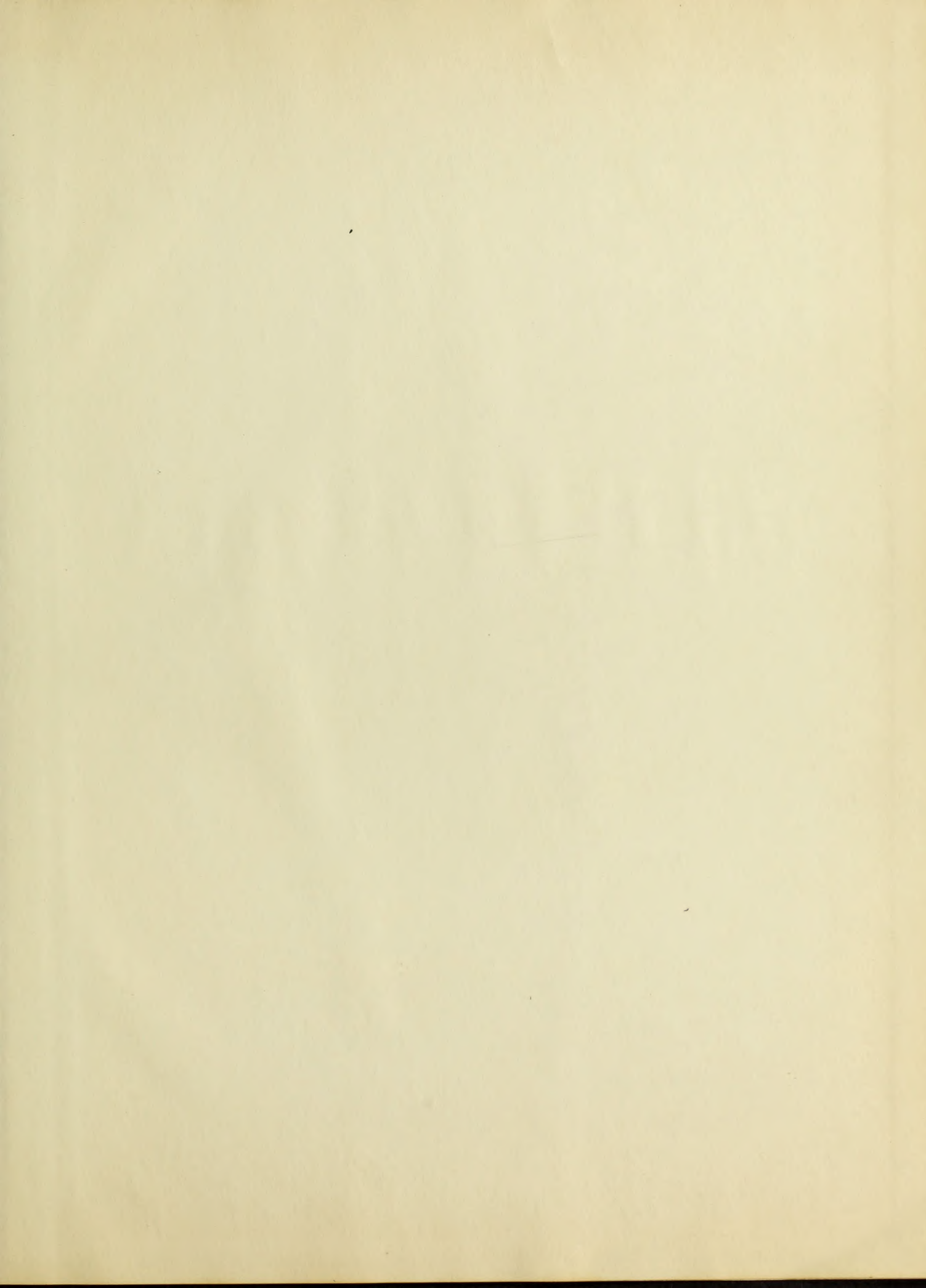
Original Learning			Relearning		
U.W.	R.W.	R.S.	U.W.	R.W.	R.S.
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17
18	18	18	18	18	18

Written Recall

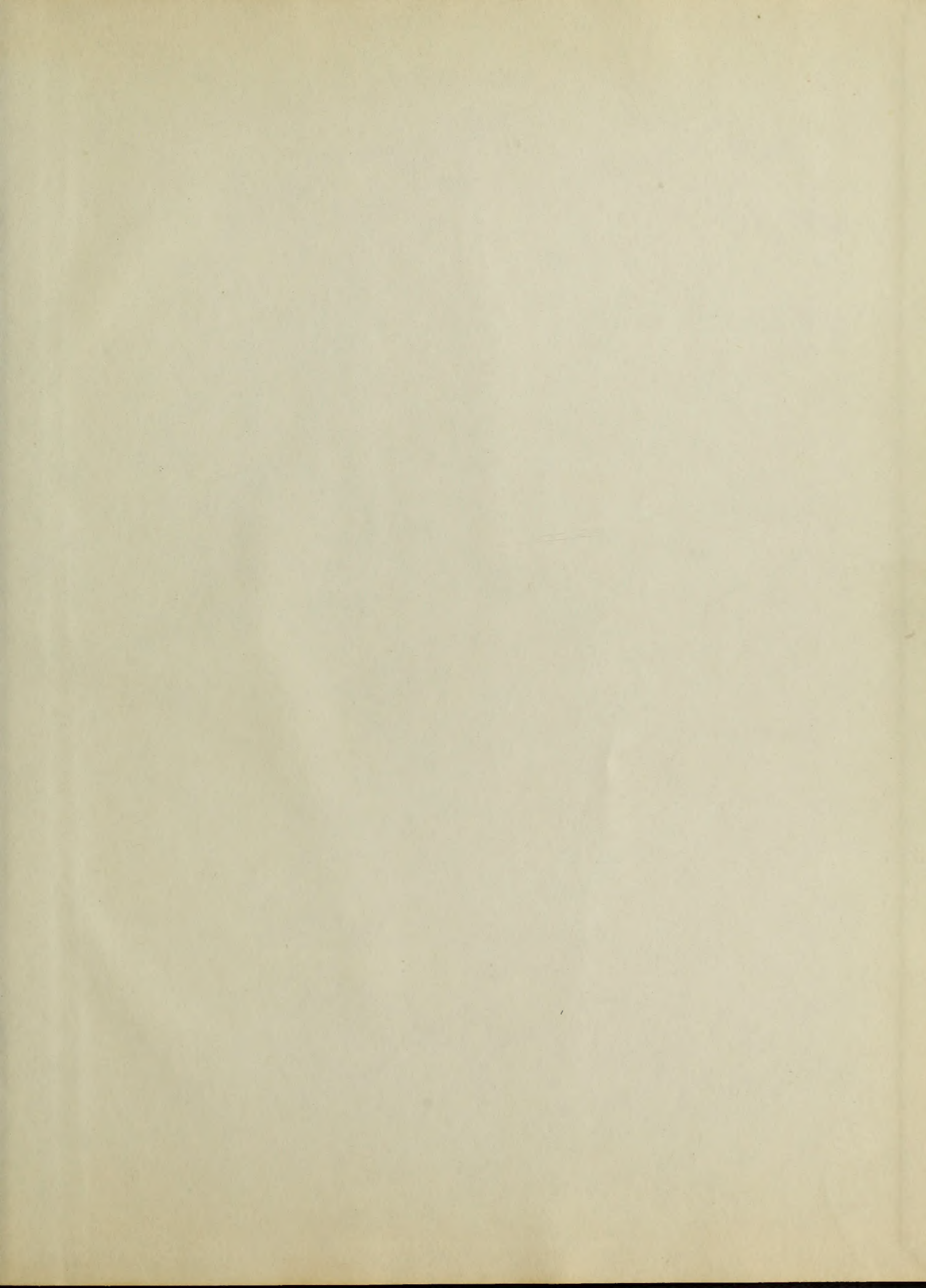
One-Week Interval

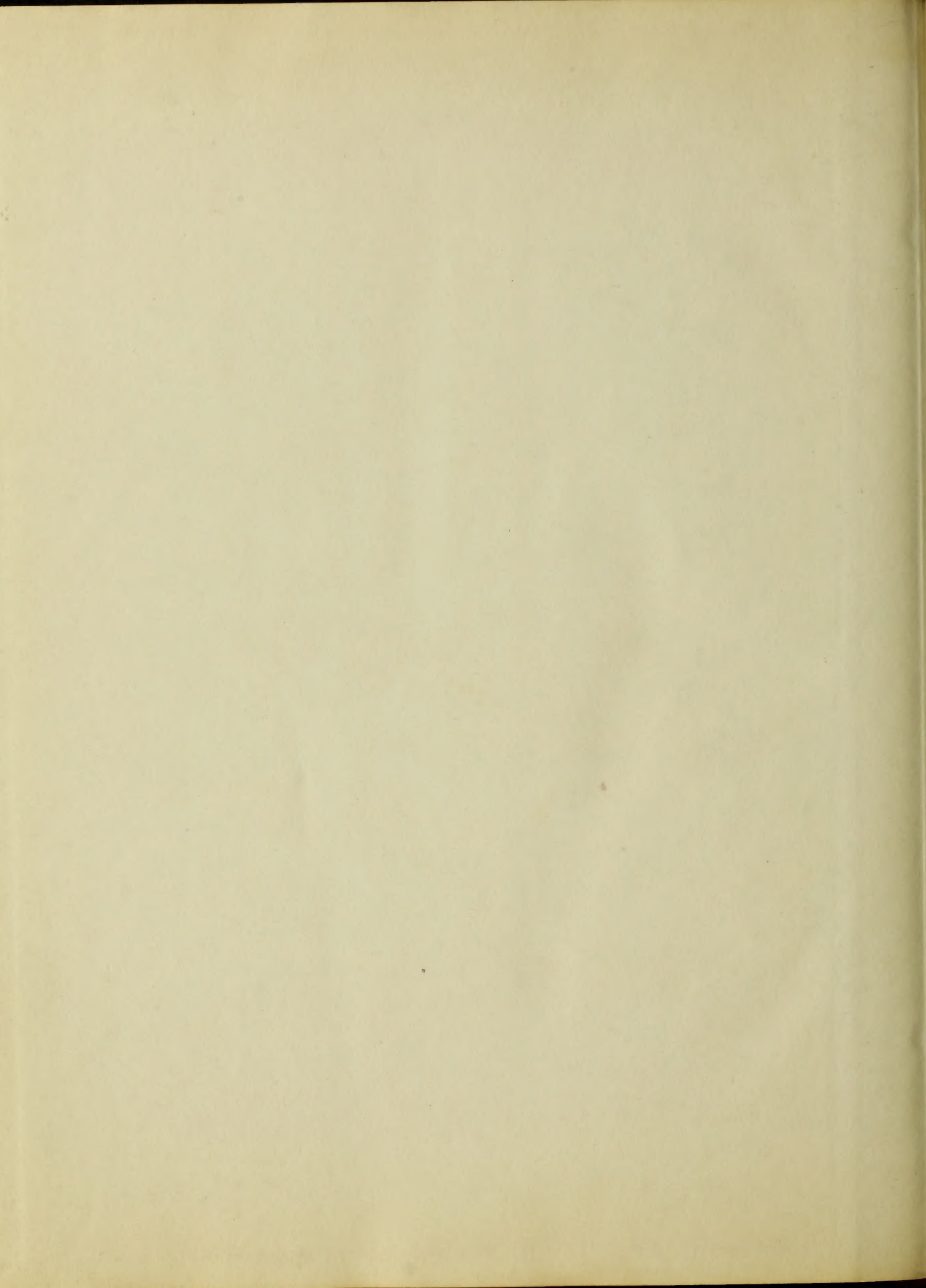
U.W.	R.W.	R.S.
shoreline	table	rod
temper	chair	rec
bishop	seat	plj
cluster	stool	bsp
business	dinner	
ashes	settee	
captain	davenport	
merchants	note	
uncle	lounge	
divorce	bed	
leather*	mattress	
	spring	
	linen	

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ww

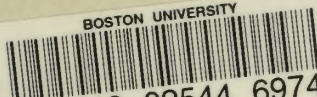








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